JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. LXXX., No. 2057.—TUESDAY, OCTOBER 14, 1902.

EDITORIAL NOTES.

The New Institution of Gas Engineers.

IT is our pleasure to announce in the present issue, to all whom it may concern, that, the necessary agreement of the governing bodies of the two organizations having been arrived at, the formal preliminary steps towards the union of the Incorporated Gas Institute and the Incorporated Institution of Gas Engineers have been taken; and an extraordinary general meeting of each Society respectively has been called, in terms to be found elsewhere. for the 1st of November, when the legal procedure for dissolving the Societies and reincorporating the members in a new one will be duly initiated. Every individual whose rights in either organization are involved in this proceeding has, of course, been notified of what has been done and is now proposed; and the two Councils have acted in the matter with so much consideration and single-minded devotion to the major interests of the profession and the industry which the new Institution is to represent, that they have collectively and individually good right to expect the support of every one of their constituents. It is sincerely to be hoped that the organic resolutions which will put an end to a state of division, and unite the followers of the industry in a common cause, will be adopted unanimously. There may, of course, be minor differences of opinion in respect to details among so numerous a body of men all trained and habituated to the continual exercise of individual judgment; but these cannot depress the balance against the crying need that exists for a combination of the personal forces of the gas industry. Indeed, the alternative to hearty acceptance of the recommendations of the two Councils, with intention to make union effective as well as permanent and complete, is such a state of anarchy and weakness before the world that the choice of it is barely thinkable.

Wherefore let it be assumed that the new Institution of Gas Engineers is likely to be launched upon a career of usefulness and beneficence with the best wishes of those who have the true interests of the profession at heart. Without going too much into details, we venture to offer the opinion that the scheme of the new Society is highly creditable to its framers. It appears to provide for everything that much experience, not always pleasant, has indicated as desirable for such a corporate body to possess by way of powers and resources. To say that the Chart of Incorporation is a better one than either of those which it is intended to supersede, is only to say with the American sage that "hindsight is better "than foresight." The fixing of the entrance fee and annual subscription at one guinea is a point upon which the Councils are to be specially congratulated. It is quite enough for a companionship of men few of whom have guineas to spare. The fact is also to be welcomed as an indication that the Institution is to be administered in the interest of the majority of the followers of the profession, who need not only that the tax of membership upon their resources should be as light as possible, but even more that its work should be moulded to their circumstances and requirements.

For the latter reason, it may be hoped that, as soon as the new Institution is fairly started, so that the governing body can form an idea of the extent of the means at their disposal, they will address themselves to the consideration of how the organization can be made most useful and helpful to the members and the industry at large. The Institution will have no traditions to hamper it, and it need not spend an unnecessary sixpence because some older bodies of the kind do the like. We expressed the hope only the other day that whenever the new Gas Engineers' Society was founded, it might be a model of true efficiency in its sphere; and we shall cling to the aspiration until it is proved to have been wasted. The new Council should calmly and disinterestedly review the entire field of possible usefulness of such a Society, and ascertain how it might be made the most of. To hold a meeting once a year for the reading and discussion of a handful of papers, scrambled together by the desperate exertions of the Secretary, is an exploded notion of the aim and object of a professional body. The same may be said of the social features of the meetings. Self-respecting men are not likely nowadays to fall into the blunder of thinking more of the excursions than of anything else; but the importance of the mere assembling together periodically of practitioners of a common technic who have no other means of rubbing shoulders, is scarcely to be overrated. Yet experience of this and other such agencies for promoting both the formal and the informal interchange of views and observations, amply proves that the right men will not trouble to attend unless good, substantial technical fare is offered them. It has always appeared to us—whether the idea is correct or not—that one of the weaknesses of learned and technical societies which meet infrequently, and used not to show any sign of life in the intervals, is the ignoring of the independent journals which keep the thread of current developments. There is plenty of room for both agencies for the collection, recording, and dissemination of special kinds of knowledge. Some societies find it necessary to publish journals of their own; but everybody knows that these are not organs of opinion, nor agencies for the carrying on of controversies. It may be suggested that the society which meets at long intervals might address itself occasionally, with as much authority as it can bring to bear, to the more complete and exhaustive treatment of what are, or have recently been, topics of the time. This is done occasionally and accidentally; but it might possibly be done systematically.

Into the interesting fields of statutory action and of educational effort this is not the time to wander. The new Institution of Gas Engineers will not be worth much if its leaders in the future do not make it more useful than any older society has been for every grade of members, not forgetting those who most require help and guidance. All these ideals will entail much thinking over, and no good will follow mere perfunctory action along conventional lines. Traditions and divided counsels have hampered the national societies of the past, and their work has for years been little more than "marking time," while waiting for something to happen. Looking back from the present stage, one can see half-heartedness and opportunism on both sides. One team had too much dead-weight of old habit and prejudice to drag along; and the other had a task beyond its strength. There must be a fresh start, with renewed forces, and in a new spirit; and under these conditions the Institution will abundantly justify its existence.

The Midland Gas Managers' Celebration.

THE 11th of October this year possessed for the members of the Midland Association of Gas Managers quite a concatenation of events which called for special observance and celebration. Foremost in order, it was the twenty-fifth anniversary of the first meeting of the Association; secondly, in the first and second year of that quarter of a century, the President was Mr. Charles Hunt, and he has again filled the honourable position during the last year of the period. Thirdly, the 11th of October was the President's birthday; and, fourthly, the day officially marked the end of his service with the Birmingham Corporation. Under such a combination of events, it was a happy idea to shift the autumn meeting from the customary day to Saturday. Although the earnest hope expressed by the Committee, in the circular calling the meeting, that "every member" would arrange to be present, was not fulfilled, there was a much larger attendance than usual; and the number included some of those who remembered, as though it were but yesterday, the first general meeting held under the presidency of Mr. Hunt, on October 11, 1877, or the preliminary one at which the Association was formed. In this connection, the names of Mr. R. O. Paterson, Mr. W. North, Mr. W. Winstanley, and Mr. J. S. Cranmer may be mentioned. Of the remainder who were present at the first meeting, Mr. J. Annan and Mr. J. Tindall are advanced in years, and unfortunately could not attend on Saturday; and the others have passed over to the great majority.

But all the members—both old and new—who were at the anniversary celebration rejoiced greatly that Mr. Charles Hunt, who has been the keystone of the Association, was still with them, and in the enjoyment of health and vitality, which encourages the hope that many more years will witness from him valuable work for the gas industry.

Perhaps, under the peculiar circumstances of the day, the dinner and after-proceedings, which were the special features arranged for the celebration of the occasion, had the greatest interest. Happy indeed must have been Mr. Hunt to find himself presiding at the festive board with such a large number of his professional colleagues around him, all of whom were bent on commemorating, in the most natural way, the anniversary of their popular Association, and more particularly on showing their President, in both a personal and a tangible way, the great affection which they bear for him, not only on account of what he has done for the Association and the industry, but for his own sterling good qualities—revealed by performance in the past, and transparent through their innateness in the present. Upon Mr. Charles Meiklejohn, the President-Elect, fell the pleasurable duty of acting as the mouthpiece of the members, and handing to Mr. Hunt their very handsome gifts, which will memorize his professional associations in the Midlands, and typify, by their exquisite beauty, the deep regard and the fervent wishes which he will carry with him from the scene of his past thirty years' labour. Mr. Meiklejohn performed his duty in apt words and with graceful expression, which, and the marked enthusiasm of the members—together with the thought that the occasion was one after which the current of his life would be in large measure parted from friends whom he had so frequently and long met in professional and social intercourse—were sufficient to cause the recipient heartfelt emotion. The proceedings on Saturday will be of historic interest in Gas Association records.

The technical work at the meeting was of a high standard, and it showed that the lapse of years has not brought about, and the future is not likely to see, any falling off in the quality of the output. We cannot, however, on this occasion comment to any extent upon the papers. That by Mr. S. Meunier should be given the premier place in point of newness, and therefore of interest. It was on the combination of gas and electricity works; and it is a very good contribution to a controversial subject. Mr. Meunier and most of the speakers on the paper have had experience in the management of the dual lighting supplies, and their experience is, without an exception, in favour of combination in the smaller towns, and of the two supplies being under one management and engineer. They spoke of economies that can be effected by this amalgamation, and of the fact that the gas engineer is already possessed of 90 per cent. of the knowledge that goes to make a good electrical engineer, with a provident regard for capital expenditure. Admitted that all this is to the credit of combination, what is there standing to the debit? Save in the remarks of the President, there was nothing mentioned at Saturday's meeting; and the unionists practically had the argument all on their own side. However, a point may here be suggested for consideration without discussing the matter at any length; and it is one that occurred a few months since, in the course of a private conversation with an engineer who has charge of both gas and electricity works—whether at home or abroad we are not at liberty to say. His assertion was that, if the electrical works were under other management, he was confident he could increase the output of the gas undertaking to such an extent that the profit from it alone would soon be equal to that at present derived from both undertakings. The position of Electrical Engineer shackled his progress as the Gas Engineer and Manager, and, as a consequence, the gas business had been, and was, seriously retarded. This was an experience stated after several years' work in the dual capacity; and, read in conjunction with the President's remarks on the paper, it is seen that there is something not unworthy of regard to be set against all the credit items advanced in favour of combination by Mr. Meunier and others. It would have been of far greater interest had the subject been debated on Saturday from more than the one standpoint.

In the second paper, Mr. George Helps, of Nuneaton, discussed various questions affecting the slot-meter system; but we cannot congratulate him upon the clearness of the views which he wished to convey. The author's position is really difficult to understand. Looking at the paper from one standpoint, the argument seems to suggest that the utmost penny should be squeezed out of the slot consumer; and we are afraid the effect of putting into practice his conditions for this class of service would place an effective check on the growth of the system. We cannot reconcile Mr. Helps's statement that he is an ardent believer in the slot meter with the financial burdens with which apparently he would (though he denies it) crush the first principle of the system—that is, the giving of the easiest possible paying terms to a class of consumer who requires such terms to retain his patronage. All the speakers on the paper were satisfied that their charges are profitable, and that under them they are doing well. If Mr. Helps would bring conviction home to his professional friends, let him take the slot-meter accounts of any one of the speakers on his paper, and prove that that manager is living, in connection with this matter, in a "Fool's "Paradise." This would have far more effect than, we fancy, the paper will have that he presented on Saturday—excellent though it was as a promoter of discussion. Mr. J. C. Belton also presented a useful and interesting paper descriptive of his works improvements at Chester; but it was not of a debateable character.

The Coal Strikes in France and America.

Truly, the coal trade the world over is cursed, above all other trades, with labour troubles. The periods when there is no strike or pending trouble anywhere among the collieries of this country are as rare as snow in June; and a general disturbance is always within the range of the possible. This "still-vexed" condition of things is also to be observed, in a more or less marked degree, in the other coalfields of the world; and at the present moment a crisis has been reached in two important areas of those coalfields. Last week, we referred to the growing influence upon the coal trade in this country of the strike which has been in progress among the anthracite miners of Pennsylvania for some months, and has now, at the commencement of the season of greatest demand, reached an acute stage. This week, we have to record a further disturbance of the relations between demand and supply in the coal markets of Great Britain—namely, that caused by the strike of a considerable proportion of the coal miners of France, principally in the Departments of Pas de Calais and Nord, which are those lying nearest to the English coast.

This concatenation of evils, however much it may be welcomed by the coalowners, is very likely to prove, if the strikes continue for any length of time, a serious trouble to the general trade of this country—primarily, of course, to the direct consumers of coal and iron, but ultimately to industry generally. But there is certainly no cause whatever at present for serious alarm on the part of coal buyers; and it is greatly to be desired that trouble should not be precipitated, or actually caused gratuitously, by any "panic "buying." Unfortunately, the Daily Press—or rather one section of it—is always so much more concerned to be sensational than to be accurate, and is so rarely the latter that the ignorant public, guided by its ill-informed or truth-careless papers, is as likely as not to do as it did rather more than two years ago—namely, create a temporary scarcity of coal by imagining one to exist. Coal, it is true, is selling in New York at about 90s. a ton; but that is no reason why "Coal at £5 a ton" should be made a "scare" headline in English newspapers, which should, instead, seek to minimize rather than magnify the possible effects of the strikes.

For it must be remembered that, unlike the "boom" in this country of 1899-1900, which was caused by a marked and sustained increase in the volume of trade generally, any excess of demand over the supply of coal in the English market due to labour troubles abroad must be of a purely temporary character, its duration being exactly determined by the duration of those labour troubles. That is to say, the settlement of the disputes in America and France would mean a return to normal conditions, not at once, but within a measurable period of time. It is, therefore, especially necessary that, while the present abnormal conditions continue, no coal buyer should commit himself beyond the purchase of immediate requirements. The country can ill afford another period of dear coal, and every means should be used to prevent the aggravation of the existing situation by "panic" purchases. That situation is indeed, without gratuitous aggravation, sufficiently unpleasant for those in

pressing need of coal for which they have not contracted, and may also prove inconvenient for those whose contracts are made, but who know, from experience still well within memory, that "coal bought" and "coal delivered" are not by any means synonymous terms.

So far as the situation in the States is concerned, it can only be said, at the time of writing, that, as we anticipated, President Roosevelt has not succeeded off-hand in effecting a settlement of the strike, and that, in spite of numerous conferences during the past week, the prospects of a settlement appear no better than before. Coal continues to be shipped to America from Wales, and also from Scotland and the North of England; between 300,000 and 400,000 tons in all having, so far as we can ascertain, been purchased up to the present for shipment thither in the immediate future. The comparatively small available output of anthracite in this country, and the difficulties in the way of using bituminous in place of non-bituminous coal in the States, tend to restrict the buying of British coal for America; otherwise the market here would soon be in a very serious condition, considering that the restriction of output caused by the strike is about 1 million tons per week (not 100 millions, as we were made by a printer's error to state last week), that coal is already very scarce in Canada, from whence some writers have thought that the States might draw sufficient supplies, and that the demand for coal for the iron and steel works of America is so great as to prevent the bituminous coalfields from doing much to make good the deficiency. Should the proposal of the leader of the bituminous coal miners to declare a general "sympathetic" strike throughout the coalfields of the States be adopted, the effect upon the trade in every part of the world, and especially in this country, would, of course, be tremendous. But as Mr. Mitchell, of the anthracite workers, does not appear anxious to accept this offer of assistance, though he is considering it, there is no occasion at present to anticipate such a catastrophe.

In France (so far as it is possible to judge from the conflicting telegrams), about one-third of the miners have suddenly gone on strike for higher wages, shorter hours, old-age pensions, and "recognition" of their Union—a pretty comprehensive programme. Such a strike has been threatened any time these two years, but has, eventually, taken people somewhat by surprise. Politics in this case, and also in America, complicate the situation; and we are not concerned to express any opinion on the rights or wrongs of the quarrel. What we are concerned with is the serious aggravation of an already sufficiently unpleasant situation, caused by this strike coming upon the top of the stoppage in America. France is, in the ordinary course, a considerable customer of ours for coal, taking about 600,000 tons a month, on an average, throughout the year. One-third of her home production is equal to about 1 million tons per month, so that, if the strike, which affects the mines nearest the Dover Straits, should continue for any considerable length of time, our exports to France, or at any rate the demand for such exports, may easily jump up 100,000 tons per week, which is a very material quantity to deduct from the margin of coal for sale. Prices are rising considerably at Newcastle, as they have done at Cardiff and Swansea; but, we must again repeat, it is to be hoped that buyers who can possibly bide their time will do so, realizing that a collapse of the strikes abroad may come at any moment, and would speedily be followed by an easing of the situation at home.

Sunday Gas Testing for London.

The London County Council agreed without a word of question to the proposal of the Public Control Committee, mentioned last week, to spend £600 a year in testing London gas on Sundays and Bank Holidays. This is one of those little weekly extravagances of the Council, of which the newspaper reporters take no notice, while their colleagues of the editorial department thunder at large against the lavish way in which the rates are squandered. Such bodies are always exposed to the temptation to vote money for what look like small administrative expenses, but really amount in the bulk to considerable sums. How much capital or rating value does £600 a year represent in the case of London? One would not mind if the money were spent for any useful purpose, or for the solace of a deserving officer or two. But that is not the way of your truly Democratic body, which has principles, although it may occasionally swallow them. Rather than pay one good man well, it will pay half-a-dozen just enough for unnecessary labour to make them discontented. This Sunday labour business is really not becoming to the London County Council. All the Gas Companies have done their best these many years to dispense with it; and, as a matter of fact, the gas which is distributed in London on Sunday is made during the previous week. Yet the Gas Examiner must be at his post, irrespective of Trade Union principles, and make his tests while some are at church, and the main supporters of the Progressive principles of the Council are enjoying themselves at the club round the corner. Great is Democracy, and it will prevail—so long as somebody will pay the piper.

Justice to Gas.

It is always satisfactory to discover that seed sown again and again in apparently barren soil has at last germinated and begun to give promise of a crop. So it was with much gratification that we found that very deservedly esteemed journal, the "Pall Mall Gazette," alive last week to the shortcomings of municipal trading in certain respects which newspapers in general have hitherto ignored, though they have long been familiar to readers of these pages. Those striking articles in "The Times" on "Municipal Socialism" have, of course, arrested attention from all sides; and very remarkable are some of the journalistic criticisms that have been addressed to the clever author's matter and method. The "Pall Mall Gazette" left the subject alone for a long time; but when it did speak, it said something distinctly valuable and to the point. Setting aside the academical question of the socialistic or other character of those municipal enterprises which are responsible for the piling up of so huge a local national debt, our sprightly contemporary lays stress upon two or three matters of fact. The first of these, in importance, as in order, is the indictment of municipal speculation on the score of its interference with private enterprise. Agreeing in this with the "Engineer," the conclusion arrived at is that the opportunities of the private capitalist are being daily narrowed and cramped by the eagerness of municipal adventure. There is more in this charge than shallow Progressive partisans would either suspect or allow.

The time was, not so very long ago, when, if it occurred to the people of a town that something was lacking in the equipment or service of the community, certain of the citizens who had money to spare and a little more enterprise than their neighbours, set themselves to provide what was wanted. Thus many experiments were made at private cost, some of which, like gas and water supply, turned out well and were in some cases eventually taken over by the town; while others, like certain sewage-treatment processes, resulted in failure. Now hardly anybody thinks of doing such a thing, because the fashionable idea is that whatever is worth doing at all will be done by the local authority. Nay, let somebody try it, and he will be immediately and bitterly opposed in the name of Municipalism, not on account of what it actually does in the same line, but of what it may at some time or other think of doing. This is what the "Engineer" regards as the overshadowing of private enterprise by superior municipal assertiveness. Things have come to such a pass that private enterprise of the old-fashioned sort is apparently dead in the land. The inhabitants of any place that might be named must go without this, that, or the other service or accommodation, unless the local authority provide it for them. Whose is the fault?

This is getting the question into a circ'e. On the one hand, we are told there is no enterprise but the municipal; and, on the other, that municipalities should not run risks. We agree, of course, with the latter proposition, which is that of the "Pall Mall Gazette." The community is always protected from being unduly exploited, by the right of purchase. Latterly, however, certain pushing municipalities have not had patience to wait for profitable developments, but have "rushed" things in accordance with the craze of the moment. The chief examples of this temporary rashness are electrical tramways and electric lighting. British municipalities are committing themselves to enormous expenditure for electric tramways, in blind confidence that the increase of traffic will pay for the additional outlay. The probability is that electric tramways will be superseded in

the general service of the community by motor road carriages, even as electric lighting has been beaten by "improved gas illumination." The last is the climax to which we have been leading up. That it should have become a settled conviction of a leading London newspaper that electric light is rapidly being put into the second place by incandescent gas, is well worth recognizing here. After this, who shall say that the merits of gas are invariably ignored by the newspaper press? Conviction of this truth has been long in coming; but it has arrived at last.

Headship of the London County Council.

THE first meeting after the holidays of the London County Council was not wholly devoted to charging the ratepayers for the Sunday and holiday testing of gas, as mentioned in another paragraph. Before knocking off this little matter of business, the members sat patiently while their Chairman, Sir J. M'Dougall, expatiated upon the work of the Council for the past year. This was not a particularly inspiring oration, being of a piece with the customary address with which the Chairman of a Company moves the adoption of the report and accounts for the year or half year as the case may be. In looking into reports of this kind of official speech, or while listening to them, one can easily detect the note of amateurishness which explains so much that would otherwise be a puzzle in the working of companies and local authorities. The British public complain very often, and justly, of the shortcomings of companies and public bodies, without always knowing precisely what is the matter. In nine cases out of ten, it is simply weakness at headquarters; and where this condition prevails, the Chairman generally betrays it in his official address. It is not that he makes mistakes—his prompters take care to look well to that. The sure sign of a weak Chairman is his propensity to drag in wholly irrelevant and perfectly meaningless comparisons and analogies with the object, as he fondly imagines, of impressing those who are still more amateurish than himself with the magnitude or other quality of the operations over which he presides. Thus Sir J. M'Dougall could not, for the life of him, help saying the other day that the aggregate of the London County Council's financial transactions last year amounted to upwards of £10,000,000, "or more than "the expenditure of many a European State." What in the world have such expenditures in common? It cannot be that the Chairman of the London County Council wishes it to be understood that he would like to take precedence of the King of Denmark! He does not mean anything quite so silly, any more than a certain Gas Company Chairman once did when he made a very similar observation. The point rather is, that in indulging in such irrelevancy the worthy gentleman posts himself as a trifler. The thing that strikes him is true enough; but it has nothing to do with the case. After that, it is not surprising to find people writing to the papers pointing out that Sir J. M'Dougall has no competent knowledge of finance or business. This refers to his confessed inability to distinguish between the gross and net profits of a trading concern, and to his equal uncertainty as to whether a municipal trading department ought to return a clear profit or not. Even where it does not pay its way, such an undertaking still renders a public service; "and if the public good resulted in a charge upon "the rates, it was still public good." Just so; but that is not precisely the case which the advocates of municipal trading prefer to argue for in advance. Who was it that called his young son to observe with what little wisdom the world is governed? Local self-government and joint-stock trading have been invented since that observation was called for; but it still holds good.

The Miners' Conference at Southport—The Question of a "Strike in Sympathy."

THERE is one consolation that coal buyers may take to their troubled souls, and that is that there is no fear of the miners in this country going out in sympathy with their "brethren" in France and America. This is very evident from the proceedings at the annual conference of the Miners' Federation at Southport last week, the report of which is not likely to increase the sense of reality in the minds of the delegates to the next International Conference of Miners. At these "international" conferences, there is always a lot of talk about the need for joint action, about a universal strike, the brotherhood of man, and so forth; but we have never attached any great importance to it, nor do we believe in the possibility of a universal strike of coal miners. We were, therefore, considerably diverted, but not surprised, on reading the report of the recent proceedings at Southport, to find Mr. Pickard, M.P., the President, in reply to a suggestion from a delegate that, in the event of any more coal being exported to America, the British miners should stop work for a week, remarking, with evident pain, that "he had not "expected that anybody would raise this point." It certainly was particularly foolish and tactless of Mr. Smillie to suggest that words should be followed by action in such a case. It was obviously so much wiser to send the American miners £1000 (which, as Mr. Pickard naively said, "*when* "*put into dollars* seemed a very large sum"—is not that a delicious and illuminating remark?), and then to remain at work, and earn a hundred times this amount of money through the postponement of further decreases in wages, which is the certain result of the increased demand due to the strike.

The only other incident of importance at the Southport conference—and it is one likely to be of very great moment a year hence—was the discussion, in private, of a proposal that no section of the Federation (and this includes Scotland and Wales) should enter into any wages agreement binding such section beyond the end of 1903, when the present agreement in the Federation districts in England terminates, in order that joint action may then be taken to secure a minimum wage for all districts, and to raise that minimum to a higher standard than the present. A recommendation to each section to adopt this policy was carried unanimously; and it was determined to hold a special conference next January to consider and decide upon any matter arising out of this resolution—in other words, the actual planning of the campaign is not to be entered upon until after the crisis in South Wales has been reached. The import of this policy of forming one Conciliation Board to govern wages throughout the coalfields of Great Britain (except those of Northumberland and Durham) is obvious; and the question of whether or not the coalowners will consent to adopt it, and, if they do, whether they will agree to raise the minimum wage, is one that will be of serious moment to coal consumers next year. With strikes now raging in America and France, the sliding-scale agreement about to expire in South Wales, and the megalomania of Mr. Pickard and his Federation in the background, the prospect of a quiet coal market in the near future is not a very bright one.

End of the Llanelly Strike.

REFERRING to our remarks of last week on the ill-timed strike of the Llanelly firemen members of the Gas Workers' Union, we have now to wind up the edifying story by recording that the whole affair has "fizzled out," after the usual amount of bombastic talk to cover the retreat of the baffled force. This termination of a strike which should never have been entered upon cannot but damage the reputation of those concerned in promoting or abetting it. The fact that the eight-hour day forms one of the fundamental tenets of the Gas Workers must explain Mr. Will Thorne's attitude in regard to this petty outbreak; but, as a sensible man, he must have felt annoyed at the inconsiderate and precipitate action of his Llanelly hands and their local leader in forcing the question as and when they did. Besides, it gave the other Trade Union chief, Mr. Ben Tillet, an opportunity for posing as the reasonable, the agreement-abiding "boss," of which he was not slow to avail himself. Meanwhile, the claims of the strikers were brought before the local Conciliation Board; and it was decided that an Investigation Committee, consisting of three masters and three men, should visit the works involved in the dispute, and endeavour to arrange satisfactory conditions of work and wages—"work to be resumed as soon as possible on the old "conditions pending settlement."

Of course, there had to be a speech from Mr. Thorne to a mass meeting of the workpeople to explain all about it. He spoke according to book, of the "strain" of watching and stoking boilers for a twelve-hour shift; averring that this is worse than slavery, and that "niggers would not "work as these men did." It is one of the most wonderful of the many wonders of human nature that men who know what boiler firing is—or retort stoking, for that matter—can utter and listen seriously to this sort of talk. Of course,

no man could stoke furnaces continuously for twelve, or even eight, hours a day, and live. We had all that threshed out in London thirteen years ago, when amiable notables, not averse to a little self-advertisement, at first swallowed all this kind of misrepresentation of the facts with childlike confidence. In the present circumstances, it was rather a lame conclusion for the Gas Workers to consent to a re-commencement of the alleged slavery, even though their leaders swore that they should not work long under the present conditions. If these were so bad as represented, they ought not to endure for another day. They should have been protested against at the general meeting of the trades of the district in July, when the local guide, philosopher, and friend of these victims signed the ensuing year's settlement without reserving any question of the firemen's condition. As it is, the end of the strike that has actually been arrived at by common consent is a confession that the firemen's lot is not unendurable, even if it is held to be susceptible of improvement, like most other conditions of human existence. When so much cannot be said of any occupation in which men have to earn their bread, the riddle of the painful earth will have been solved, and the Millennium will have dawned. It can hardly be agreed, however, that the proceedings of the Gas Workers tend at all to the expediting of so desirable a consummation.

A Wise Step at Nottingham.

The Nottingham City Council and the Gas Committee have gone the right way to work with regard to clearing up the controversy which is at present raging concerning the management of the Gas Department. First of all, the charges of Alderman Radford, and then the special report of the Gas Committee issued in reply thereto, opened up a series of questions which, for the sake of the peace of mind of the ratepayers, if for no other reason, it was in the highest degree important should be thoroughly threshed out. The City Council have (as will be seen from the proceedings on p. 1031) done their share towards this end by amply discussing the matter in public at their last meeting; and the Gas Committee have taken a still stronger step in the same direction by securing the services of Sir George Livesey to examine and report upon the undertaking. In deference to the very decided opinion of members of the Council, the Gas Committee consented to withdraw their special report, which met with very severe treatment at the hands of Alderman Radford during the discussion that took place at the meeting; and the whole question may therefore at the present time be regarded as *sub judice*. Under the circumstances, it would not be proper, at this juncture of affairs, to offer any opinion here as to the rights or wrongs of the case, and the merits or demerits of the various arguments adduced on either side; but we can nevertheless heartily congratulate the Gas Committee on the excellent resolution they have arrived at to consult a gentleman whose opinions carry the greatest possible weight, and at whose decision, whatever it might be, neither side will be at all tempted to cavil. Nothing but good can result from this step; and thus the agitation has not been fruitless. The ratepayers will feel reassured when the best and the worst of the existing state of things are laid before them on unimpeachable authority; and the path of the newly-appointed Manager, Mr. J. H. Brown (who, it is stated, is also to be asked to draw up a report), will at the same time be rendered very much easier by the final clearing away of the doubts and difficulties by which the Nottingham Corporation Gas Department appears just now to be surrounded.

A Gas Manager's Authority.

There will be found reported in our "Legal Intelligence" to-day a case of considerable importance to gas companies and their managers and secretaries, as it deals with a point about which a certain amount of confusion frequently arises. The sum in dispute in the present instance was a small one; but there was a question of principle involved which makes the finding of the Jury a valuable one. The action was originally against the person who gave the order for the work to be done; and he has since left the country to take up an appointment abroad, so that the Company were joined as defendants. The plaintiff was employed to prepare the balance-sheets of the Holmfirth Gas Company, and the Directors were aware that he was doing the work. But when sued they urged that their then Manager (Mr. Hubert Russell), who had engaged the plaintiff, was already being paid for doing the work, and that, therefore, they should not be called upon to pay someone else for undertaking it. This, however, was clearly a matter between Mr. Russell and the Company, and had nothing whatever to do with the plaintiff, who concluded, as most people would have done in the circumstances, that Mr. Russell was authorized to engage him on behalf of the Company. The only point which seemed to raise any real difficulty in the case was that the plaintiff had never, when he failed to get his account settled, applied to the Directors of the Company for payment. But he explained this by saying that he did not wish "to go behind" Mr. Russell. The Jury found that the Manager ordered the work to be done on behalf of the Company; and few people, after careful consideration of the facts, will feel inclined to question the soundness of this decision. It was stated in the course of the case "that it was absolutely necessary, in the interests of all employers of labour, that they should know once and for all where they stood in regard to their high-salaried servants." Just so; but, in turn, it is equally necessary that these officials should know exactly how they stand in the matter of authority to order work to be done. The conditions must, of course, vary in different cases; and at Holmfirth so much was left to Mr. Russell's discretion that he might well have thought he was justified in taking upon himself to employ a professional accountant to prepare the Company's balance-sheet. That he made very good use of his authority was, as the Judge pointed out in his summing up, proved by the rapid increases which were granted in his salary; and it is a pity to see the Directors of the Company afterwards questioning his conduct, as in the present instance they have seen fit to do.

Statutory Gas Companies and Building Lines.

Some interesting points have arisen in connection with a new holder which the Harwich Gas Company are erecting under powers contained in a Provisional Order granted this year. This work has all along met with a considerable amount of opposition, though not sufficient to prevent its being proceeded with. At last, however, the opponents seemed to have a prospect of scoring, and notice was given by a member of the Town Council that he would move a resolution on the subject at last week's meeting. This motion turned out to be to the effect that, in the opinion of the Council, the Company had contravened section 3 of the Public Health (Buildings and Streets) Act, 1888, by the erection of a holder which projected beyond the main wall of the house next to it in the same street. The Town Clerk, who also occupies the position of Solicitor to the Gas Company, anticipating the question which was to be brought forward, issued in advance (as Town Clerk) a circular-letter, addressed to the members of the Council, in which he gave his views on the points likely to be raised. This letter, which will be found reproduced (practically speaking in its entirety) elsewhere, deals fully with the matter. In the first place, he gives it as his opinion—and it is also the opinion of Counsel consulted by the mover of the resolution—that a gasholder is a "building" within the meaning of the Act; but he contends that, where a building is in two streets—which is the case with the holder in question—it should only be bound by one building line. It is admitted that the holder is being erected beyond the building line of one of the streets, but not of the other. It is, of course, somewhat difficult to say which is the front of a gasholder; but if it is a building it really should have a front, and so it is presumed that the Harwich holder fronts on to the latter of these two streets! The most important part of the Town Clerk's letter, however, is that in which he says the Gas Company's premises are not an ordinary house, and their method of dealing with their land is controlled, not by a general statute such as that quoted, but by their Special Act (the Harwich Gas Order, 1902), "which overrides it." Does it? Cases are quoted to support this view; but we notice the writer has overlooked one which seems to be quite as applicable, and in which the decision of the High Court was altogether different. In 1899, the Wandsworth and Putney Gas Company were summoned by the London County Council for an alleged contravention of the London Building Act, 1894; and though the Magistrate found in favour of the Company, the High Court, on appeal, reversed this judgment. Mr Justice Ridley, it will be remembered, held that "the beneficiaries

under a Special Act . . . must be held to be subject to the general provisions of Acts of Parliament on the . . . subject [the improvement of the sanitary condition of towns], unless there was something inconsistent with their own Act." The Company, therefore, were not empowered by their Private Acts to contravene the Public Act relating to the building line. It will thus be seen that some very nice points have been raised at Harwich, and such as would gladden the hearts of the lawyers, if it were determined to obtain legal decisions upon them. This, however, we are, in the interests of both parties, glad to see the Council have no intention of doing, for the motion was defeated—thus justifying the Town Clerk's confidence that the majority of the members would be prepared to take his advice.

A Junior Gas Association for London.

There has been no indication, either by act or promise, on the part of the existing senior gas organizations to take up the claims of the young men of the industry to the provision of greater opportunities for extending their knowledge of methods and actual work, nor has the necessity been publicly recognized by those bodies in any way. This is not encouraging to the young men of the industry who are training to shoulder the increasing burdens and more exacting requirements of management, nor does it help those who aspire to the possession of the best intellectual equipment for the future to know that among their elders and principals there are those who pooh-pooh the whole idea. But while this is so, it is gratifying to be able to state that there are many in the gas engineering profession who would support a project such as has been suggested, if put forward under the auspices of the leading gas organizations, or by the representative body of the future. Therefore, we are still hoping that our intercession will bear fruit. Meanwhile, as the columns of the "JOURNAL" are constantly showing, the enthusiasm of the junior gas engineers of the Manchester district exhibits no sign of abatement; and it was with great gratification that we recorded last week the intelligence that, through the interest and kind offices of Mr. Walter Grafton, F.C.S., a Junior Gas Association for London is in a fair way of being an assured fact. The successful work which Mr. Grafton has done, through the "Gas Manufacture" classes at the Regent Street Polytechnic, is well known to our readers, and has gained for him the full confidence of both the Polytechnic authorities and the students. The former have, we learn, promised "considerable aid" in helping forward the movement for the formation of a Junior Gas Association; and, on the announcement of the fact by Mr. Grafton at a meeting of the class, no less than thirty of the students announced their willingness to become members. Many former students have also promised their adherence; so that here we have all the requisites for a good start—a sufficient nucleus, excellent influence, and skilled direction. In wishing the projected Association the utmost possible success, we may assure Mr. Grafton, and those who will share with him the responsibility of guiding it to, and maintaining it in, a state of prosperity, that they may depend upon the "JOURNAL" giving publicity to their progress, and making other announcements which will assist them. The object of the association of young men in this way is one we heartily sympathize with.

Women as Incandescent Burner Inspectors.

A new departure is to be made by the Plymouth and Stonehouse Gas Company in connection with a scheme for the maintenance and cleaning of consumers' incandescent mantles and burners. Instead of employing men for the purpose, as is done by others, the Company propose to engage women, and train them for the work. It is thought that they will perform the light duties with perhaps greater deftness than male assistants, and that the work will be done by them with more satisfaction, both to the consumers and the Company, than if men were engaged in it. In a district like the West of England, where the openings for female labour are comparatively few, the experiment is certainly worth trying on grounds of economy. If it succeeds, the Plymouth Gas Company will no doubt find imitators; while if it should fail, there will be little difficulty in making a change, and employing a male staff. There does not, however, seem to be any reason why the plan should not prove successful. With the rapidly growing business of the Company and the impetus imparted to the mantle trade by the reduction in prices, the staff of lady inspectors ought soon to be a large one. The Company evidently anticipate an extensive business, for they propose to undertake a monthly inspection and cleaning of the burners, together with the upkeep of burners and rods, at a charge of 6d. per burner per quarter. If experience shows that it can be done for less, the cost to the consumer will be reduced; the object of the Company not being to make a profit, but to popularize the use and sale of gas.

Municipal Gas-Works Profits and Income-Tax.

With the income-tax at the present figure, the Inland Revenue Commissioners get a very fair picking from those municipalities who prefer to make substantial profits out of their gas consumers rather than sell the gas at a lower price. The point has been brought out at Rochdale that income-tax (at 1s. 2d. in the pound) on the gas profits is equal to about 1d. per 1000 cubic feet. It is stated that the Engineer (Mr. T. Banbury Ball) estimates that a penny reduction in the price of gas would represent a loss of £1800 in profits. This sum is almost equal to the amount paid last year in income-tax at 1s. 2d. in the pound—viz., £1580—which means that gas consumers have to pay very nearly 1d. per 1000 cubic feet for income-tax on profits that are distributed, by lessened rates, over the whole borough. Members of the Merchants and Tradesmen's Association consider it the height of folly to take the profit represented by this income-tax out of a section of the ratepayers, and then have to hand so many hundreds of it over to an outside body. Many other people will agree with them.

WATER AFFAIRS.

Appropriating the Water Profits at Derby.

THE recent action of the Derby Town Council in appropriating about £7000 of the profits realized from the supply of water for the purpose of clearing off the losses resulting from the electric light undertaking, as reported in another column, although suggested by the Borough Accountant and sanctioned by a considerable majority of the members, is one which does not commend itself to general approval. True, the Water Committee have a reserve fund of about £52,000; but, as Sir Henry Bemrose pointed out, the town are now engaged, in association with several of their neighbours, in carrying out a very large scheme of water supply from the valley of the Derwent, involving an expenditure of about £3,000,000; and, in view of the demands upon their resources which this scheme will entail in the future, the Committee are naturally desirous of having ample funds in reserve to meet them. Yet, in face of this, the Council deliberately divert a portion of this reserve from its proper purpose, in order to make good the deficiencies arising from an unsuccessful business upon which, to our minds, they should never have embarked. It is all very well to say the appropriation of this money must be regarded as a temporary loan from a prosperous branch of the municipal work to another branch which, for the present, is rather in low water. The point is, how many years are likely to elapse before it is able to pay its way, and dispense with the bolstering up it is now receiving? Because, as the Mayor very properly reminded the Council, if they go on for very long taking £7000 or £8000 a year from the water reserve fund, the existing £52,000 will have a very different appearance when the time comes for drawing upon it. The circumstances under which the proposition was placed upon the *agenda* were not altogether satisfactory, as the Water Committee were not consulted in any way before some of the funds for which they are responsible were coolly taken out of their possession, and employed for an extraneous purpose. This is a precedent which it may be hoped will not be followed in the Derby or any other Council.

Water Charges and the Trade of Dundee.

EARLY in the present year attention was directed in these columns to the above subject, in connection with correspondence which had been appearing in a local paper. It was then shown that the general policy pursued by the Corporation of Dundee during the past twenty years had

been detrimental to the interests of the city. Proof of this was afforded by the attitude of the Corporation towards the outside burghs and outlying districts; for while, on the one hand, it was such as to militate against the inclusion of these places within the municipal boundary, on the other it favoured their adoption for residential purposes in preference to the city. The effect of this has been to reduce the increase in population from 14,881 in the ten years ending in 1891, to 5161 in the succeeding decade. What the figures will be in 1911 may be surmised from those given. Meanwhile, people who are compelled to remain in Dundee have to bear the burden of taxation, which does not grow lighter. One very important cause of this exodus from the city is to be found in the decision come to some time ago to include a number of outlying burghs in the compulsory water area of the Corporation, thereby affording them a supply at the rate charged within the municipal area, and enabling them to offer this privilege, combined with reduced taxation, to all who chose to avail themselves of it. The seriousness of the present position of affairs is once more forcing itself upon public attention, and the matter is being again discussed in the papers. Both within and outside the Town Council, we learn, able citizens are applying their minds to the solution of the problem which confronts them. But they are met by serious difficulties, inasmuch as everything the Corporation have in hand tends to increase the taxation and reduce the number of those who have to bear it.

The initial mistake was the extension of the water area beyond the municipal boundary, the effect of which, as we gather from the correspondence, has been fatal to the progress of the trade and industry of the city. This will be apparent from the following figures. In the year 1880-81, the total water revenue amounted to £37,532, of which roughly one half was for domestic and the other for trade supplies. In 1899-1900, the total was £49,008, of which £17,331 was contributed by the domestic rate and £28,427 by the trade rate. So that in the ten years the proportions, which had been 48 per cent. for each class of service, had become 35 per cent. for the domestic and 58 per cent. for the trade supply. The rate for the former has been reduced by the simple process, as the correspondent whose letter lies before us puts it, of "transferring the burden from the shoulders "of one set of ratepayers to the back of another set "—in other words, the whole financial stress of the Water Department as now administered is thrown upon the industries of the city, instead of being placed upon the outside supplies, as it is in other large and thriving towns. We agree with the view that is now finding expression in Dundee that the Corporation should have kept a free hand in regard to the terms on which water should be supplied to the outside burghs until these became absorbed in the municipal area. The only remedy for the present condition of things appears to be to raise the charge for water beyond the city. But, unfortunately, this cannot be done unless the existing arrangements are cancelled; and this can only be effected with the consent of Parliament. Whether the feeling on this matter is sufficiently strong to make itself felt in the Council we have no means of telling. But, in any event, some change in the policy which has been productive of results detrimental to the progress of the city as a commercial centre seems to be urgently called for.

The Change in the Staff of the Commercial Gas Company.—In noticing this matter last week, it was assumed that Mr. Stanley H. Jones would, at the close of the year, succeed to the dual position of Chief Engineer and General Manager now occupied by his father, who will then join the Board. It has been pointed out to us, however, that so much as this was not stated by the Chairman when referring to the matter in his address to the shareholders at the half-yearly meeting; and we are asked to make it quite clear that the appointment of Mr. Stanley Jones is to the post of Chief Engineer only.

We Live and Learn.—A Norwich paper publishes the following: "With shortening days and need for illumination during the dark days and long nights of winter, it is well, says a medical paper, that householders and all who employ gas in their houses should previously investigate the pipes and burners under their control. Many servants in kitchens where gas cooking is in vogue, girls in restaurants where water and eatables are kept hot by constantly burning gas, suffer from various ills dependent on blood-poisoning, and much of the anæmia so prevalent among young females of this class is undoubtedly due in part to gas leakage." It would be interesting if our medical contemporary would inquire why the life of men employed in gas-works stands well among the averages in other industries.

ESSAYS AND REVIEWS.

THE AMALGAMATION OF THE INSTITUTE AND THE INSTITUTION.

Last Saturday a circular was issued by Mr. J. W. Helps, the Hon. Secretary of the Joint Councils of the Incorporated Gas Institute and the Institution of Gas Engineers, reviewing the progress of the movement for the amalgamation of the two bodies. It sets forth that at the meeting of the Institution on the 30th of April last, the result of the discussion of the amalgamation question was the passing of the following resolutions:—

(*a*) To admit to the class of honorary members such members of the trading community as shall, in the opinion of a clear two-thirds majority of the Joint Councils, have rendered distinguished services to the profession of gas engineers, or have specially promoted the interests of the gas industry.

(*b*) That existing members of both Societies, who, having ceased to hold positions as engineers or managers of gas undertakings, would be ineligible under the proposed new rules, be dealt with under the terms of the foregoing proposed resolution; and those existing members of both Societies acting solely in the capacity of secretaries of gas undertakings be eligible for election as associate members of the proposed new Association.

It goes on to say that on the 10th of June the matter received the consideration of the members of the Gas Institute, when identical resolutions were unanimously carried.

In order to give effect to these resolutions, the Councils of the two Societies decided to act in concert, and jointly deliberate on the whole subject. Accordingly, a meeting of both Councils, which was very largely attended, was held on the 21st of June—Mr. A. Dougall, the President of the Gas Institute, being elected Chairman, and Mr. Helps Honorary Secretary. Various points in connection with the suggested new rules, and as to the mode of procedure necessary to carry out the terms of the resolutions, were carefully discussed, and finally a Sub-Committee, consisting of the Chairman and the Honorary Secretary, was appointed to consider the proposed Memorandum and Articles of Association, with the special object of giving effect to the two resolutions, and to report later to the Joint Councils. The Sub-Committee were empowered to employ what legal advice they thought necessary.

Numerous meetings of the Sub-Committee were held, at most of which Mr. Hood (of Messrs. Radcliffe, Cator, and Hood) attended, and at which Mr. W. T. Dunn, the Secretary of the Gas Institute, was also present. After very careful deliberation, the Memorandum and Articles of Association were revised, and proofs prepared for presentation to the Joint Councils. On the 20th of September, a second meeting of the Joint Councils was held, at which Mr. Hood attended by invitation. Some time previous to this meeting, each member of the Councils had been provided with a copy of the revised Memorandum and Articles. The first matter discussed was as to the manner in which the ballot necessary under Resolution (*a*) should be carried out. The Solicitor pointed out that before anything definite in this connection could be done, it was absolutely necessary that the new Society should be registered, as it was obviously impossible to elect gentlemen to become honorary members of an Institution not at present in existence. The Memorandum and Articles were then considered clause by clause, and after several alterations and amendments had been made, it was proposed and unanimously resolved that they should be adopted as amended. It was also decided that the Sub-Committee should draw up a report on the deliberations of the Joint Councils, and that a copy should be sent to each member of both Societies, with a print of the new Memorandum and Articles of Association.

The opinion was then expressed that it would be very desirable to hold the extraordinary general meetings of the Institute and of the Institution as soon as possible, and, if practicable, on the same day. The 1st of November was fixed as a suitable date for the meetings. Notices convening these meetings have accordingly been issued, containing full particulars of the business to be transacted. The following are the resolutions to be proposed:—

(1) That it is desirable that the Gas Institute and the Institution of Gas Engineers be amalgamated.

(2) That it is desirable to effect such amalgamation by the voluntary liquidation of both of the above-named Societies, and by the transfer of all their assets to a new Society to be registered under section 23 of the Companies' Act, 1867, to be called "The Institution of Gas Engineers" (Incorporated 1902), with a Memorandum and Articles of Association in the form of the draft issued to the members, produced to this meeting, and hereby approved and identified by the signature of the President, subject to such alterations (if any) as may be approved by the Council.

If the foregoing resolutions are passed, the final steps for the registration of the new Institution will be at once taken. Within one month from the date of the meetings, a second one will be called for the purpose of confirming the resolutions; and if the voluntary winding up of the two Societies is agreed to, Liquidators will be appointed to carry out the necessary formalities.

At the last meeting of the Joint Councils, a discussion took

place as to the name by which the new Society should be known; and a general opinion was expressed that the title the "Institution of Gas Engineers" was the most suitable and distinctive. Eventually it was proposed by one member of the Gas Institute and seconded by another—"That it be recommended to the members at the extraordinary general meetings that the name of the new Society be the 'Institution of Gas Engineers.'" This was unanimously carried; and the meeting concluded with a very generally expressed hope that the much wished-for, but long-delayed, amalgamation would very shortly be accomplished.

The following are the principal clauses of the Memorandum and Articles of Association:—

Clauses 1 to 3 of the Memorandum set forth that the name of the Association is the "Institution of Gas Engineers"; that the registered office is to be situated in England; and that its objects are to "acquire and take over the property and assets of the Incorporated Gas Institute and the Incorporated Institution of Gas Engineers," promote the advancement of the gas industry, and (subject to clause 4) to "enable persons who are, or have been, engaged in the conduct of gas undertakings, or who have been regularly educated as gas engineers, to meet and to correspond." A number of other objects are specified in clause 3, including the giving of the Legislative and public bodies and others facilities for "conferring with, and ascertaining the views of, persons engaged in or interested in gas manufacture, engineering, and administration, as regards matters directly or indirectly affecting the manufacture and application of gas." Clause 4, to which reference is made above, is as follows:—

No person shall be qualified to become a member or associate member or associate of the Institution who, in the opinion of the Council, is actively engaged in or about the management or business, either as principal, director, or manager of a joint-stock company, or as agent or traveller of any trading company, firm, or concern doing business with gas undertakings, whether as vendor or as purchaser.

Clause 5 specifies that the income and property of the Institution shall be applied solely towards the promotion of its objects, and no portion is to be paid or transferred, directly or indirectly, by way of dividend, bonus, or otherwise howsoever by way of profit to the members. Nothing, however, is to prevent the payment, in good faith, of remuneration to any member of, or person attached to, the Institution, or to any officer or servant of the Society, or to any person, in return for services actually rendered or to be rendered, or the conferring upon, or payment to, any such member or person of any prize or remuneration, or similar object. If any member pays or receives any dividend, bonus, or other profit, in contravention of this paragraph, his liability is to be unlimited.

Coming to the Articles, the first to call for notice is the fourth, which runs as follows:—

(1) Such members, associate members, and honorary members of the Gas Institute, and such members, associates, honorary members, and students of the Institution of Gas Engineers as are eligible under section 4 of the Memorandum of Association shall, upon signing and forwarding to the Secretary, so as to be received by him before the 29th day of November, 1902, or (in the case of those who reside outside the limits of Europe) before the 31st day of March, 1903, a claim according to Form A in the Appendix, become respectively members or associate members, honorary members or students of the Institution without election, and without payment of entrance fee.

(2) Any person who, having been a member, honorary member, extraordinary member, associate member, or associate of the Gas Institute, or of the Institution of Gas Engineers respectively, who would be ineligible as a member or associate member of the Institution under Section 4 of the Memorandum of Association, may, upon making application on Form A in the Appendix, and forwarding it to the Secretary so as to be received by him before the 29th day of November, 1902, or the 31st day of March, 1903, as the case may be, be elected an honorary member by a two-thirds majority of the Council, if in the opinion of such majority such person has rendered distinguished services to the profession of gas engineers, or has specially promoted the interests of the gas industry; and any such person who has acted solely as secretary of a gas undertaking may, on application on or before the last-mentioned respective dates, be elected without entrance fee as an associate member by a similar majority of the Council.

Subject as above set forth, every candidate for election or transfer into the class of members shall be not under twenty-four years of age, and shall come within one of the following conditions: He shall have been regularly educated as a gas engineer, and shall either (1) have been prominently occupied in the conduct of a gas undertaking for at least five years at the time of his election, or (2) be in practice as a consulting gas engineer, and, in the opinion of the Council, have acquired sufficient eminence in that profession.

The procedure in connection with the election of honorary members is set forth in Article 24, as follows:—

Honorary members eligible under Article 4 (section 2) hereof shall be elected by the Council at a special meeting of the Council to be held within six weeks from the date of the incorporation of the Institution, or, in the case of those whose applications may be sent in up to the 31st day of March, 1903, at the first Council meeting after that date; and thereafter honorary members shall be proposed by the Council at the annual general meeting of the Institution (a list of the names of persons so proposed having been sent to every member entitled to vote at least fourteen days before the meeting), and shall be admitted on the approval of two-thirds of the members present who shall be entitled to vote, and shall vote, at such election.

With regard to the contributions to the funds, the privileges of membership, &c., Article 12 specifies that every member, associate member, and associate is to pay, on election, an entrance fee of one guinea and an annual subscription of like amount, and every student an annual subscription of half-a-guinea. All subscriptions are to be payable in advance on the 1st of January each year. A subsequent Article gives the Council power, in reference to the case of any member who, in their opinion, has distinguished himself in his professional career, but who, from ill-health, advanced age, or other sufficient cause, is unable to pay his contribution to the funds of the Institution, to remit the payment of the contribution, and all arrears (if any).

Articles 32 to 34, dealing with the admission and privileges of students, set forth that any person being or having been a pupil of a member of the Institution, or of a recognized engineer, who is not under any incapacity, may be admitted as a student on the recommendation of such member or engineer; and any other person may be so admitted on a like recommendation. All such persons may remain students, during the pleasure of the Council, until they attain the age of twenty-four years. Any person who has been admitted as a student shall, if not six months in arrear with his subscription, be entitled to have notice of, and to attend, the annual general meetings, but not to speak or vote thereat, and to receive a copy of the Transactions. The Council may accord to students other privileges; but subject to such terms, regulations, and restrictions as they shall from time to time prescribe.

According to Article 35, the first Council of the new body is to be constituted as follows: All the thirty members of the Councils of the Institute and the Institution who are named in Appendix G to the Articles are to become and be the members of the first Council. At their first meeting they are to choose a President, three Vice-Presidents, and an Honorary Secretary from their number, and continue in office until the annual general meeting in the year 1903, at which the President is to retire with two of the Vice-Presidents and six ordinary members, to be chosen by seniority of service on the Councils of the two bodies, and in case of equal seniority by lot among themselves; and thereupon the Council are to choose a new President and one new Vice-President. They are to hold office until the annual general meeting in the year 1904, at which the same process is to be repeated, except that of the Vice-Presidents only one, and of the ordinary Members of Council eight, are to retire; thereby reducing the number of the Council to thirteen. The retiring President in each of such years is to become an honorary councillor for three years. At the annual meeting in the year 1904, the number of the Members of the Council is to be made up to nineteen, including the honorary councillors; and at the annual meeting in 1905, and at each succeeding annual meeting, the President, one of the Vice-Presidents, and four other elective Members of Council are to retire. Neither the President nor a Vice-President is to be eligible for more than two years consecutively.

Articles 45 to 56 deal with the work of the Council, who are to arrange and manage the entire business of the Institution, and exercise all its powers, except such as are by law or the regulations declared to be exercisable by the Institution only in general meeting. The succeeding Articles refer to the duties of the Secretary and the Auditors; and then follow the regulations relating to the proceedings at the general meetings. Articles 71 to 76 refer to the votes of members, papers and communications, and notices. The two concluding Articles (77 and 78) give the Council power, at their discretion, upon receipt of a request from a sufficient number of members, associate members, or associates, resident in any district, to create a Local Section of the Institution in such district, and to dissolve such Section at any time after it has been formed. Each Local Section is to be constituted, and its affairs carried on, in accordance with rules and regulations to be laid down from time to time by the Council.

Appended to the Articles are the various forms referred to therein. The following are the names of the first Council:—

Bower, T., West Hartlepool.
Broadberry, A. E., Tottenham.
Browne, A. F., Vauxhall.
Carter, J., Lincoln.
Chapman, J. L., Harrow.
Colman, Harold G., Birmingham.
Davis, J., Gravesend.
Dougall, A., jun., Tunbridge Wells.
Dunn, Matt., Goole.
Durkin, S. Westall, Southampton.
Gibb, W. Doig, Newc'tle-on-Tyne.
Glover, S., St. Helens.
Graham, A., Mansfield.
Haddock, W. S., Warrington.
Helps, J. W., Croydon.
Herring, W. R., Edinburgh.
Hislop, G. R., Paisley.
Holgate, T., Halifax.
Irving, D., Bristol.
Jones, H. E., Stepney.
Marshall, F. D., Copenhagen.
Martin, T. H., New Barnet.
Meiklejohn, C., Rugby.
Morley, H., Cardiff.
Ogden, S. R., Blackburn.
Thomas, O., Pentre.
Townsend, H., Wakefield.
Travers, T. P., Cork.
Troughton, J. H., Newmarket.
Wood, C., Bradford.

The extraordinary general meeting of the Institution is to be held in the Hall of the Society of Arts, John Street, Adelphi, on the day already named, at half-past eleven; and that of the Institute at the same place three hours later.

GAS ACTS FOR 1902.

The following Acts amend the statutory powers of authorized Gas Companies:—

The Barking Gas Act enables the Company to raise £75,000 of additional 7 per cent. capital, of which not more than one-half is issuable as 6 per cent. preference capital. The new capital is to be issued whether the stock or ordinary shares of the Company are at a premium or not; and no priority of tender is to be allowed to any holder of shares or stock in the Company. Shares or stock not sold at auction or by tender may be offered, at a discount on the reserve of not more than 5 per cent., to consumers and employees. One-third borrowing powers are granted. The maximum price of 15-candle gas is reduced to 4s. 8d. per 1000 cubic feet. Consumers' fittings may be specified.

The Bournemouth Gas and Water (Poole Gas Transfer) Act authorizes the acquisition by the Bournemouth Gas and Water Company of the undertaking of the Town and County of Poole Gas and Coke Company, Limited. The transaction was the subject of an agreement which is scheduled in the Act and made binding on the parties. The capital powers of the Bournemouth Company are increased by the sum of £25,010 for the purpose of carrying into effect the provisions of the scheduled agreement. The area for the supply of gas by the Bournemouth Company is altered and extended. The provisions of the Bournemouth Act of 1878 as regards standard price and dividend are not altered. The terms on which the consumers in the added district are to be supplied are set out in detail, with the intention of establishing uniformity in fifteen years between the Bournemouth and Poole prices.

The Broadstairs Gas Act enables the Company to raise additional capital to the amount of £9000 as 7 per cent. ordinary or 4 per cent. preference capital, with one-third loan. Interim dividends may be paid. Pipes may be laid for ancillary purposes with the consent of the Local Authority. Consumers' fittings may be specified. The rate of interest payable on consumers' deposits is reduced to 4 per cent. Users of gas-engines may be required to adopt anti-fluctuators.

The Bromley Gas Act converts the shares of the Company into stocks of 5 and 3½ per cent., to be transferable in £5 units. Additional capital is authorized to the amount of £100,000, which is issuable in the first place to consumers and employees at the average market price of the previous month, or not exceeding 5 per cent. under the average price. Stock remaining undisposed of in this way is to be offered for sale in the ordinary course, and if still unsold is to be offered to shareholders at the reserve price. The borrowing powers are one-third of all stock issues. The initial price of 4s. 6d. per 1000 cubic feet is retained. Persons desiring election to the Board are to give ten days' notice to the Secretary, and the name is to be posted during this period on a conspicuous place in the Company's chief office. Discounts up to 15 per cent. are allowable. The testing-place for the Company's gas is be the office of the Company in Bromley. The cost of the Act is chargeable to capital.

The Chigwell, Loughton, and Woodford Gas Act extends the limits of supply of the Company to include the parish of Lambourne, Essex. The laying of an oil pipe-line between Woodford Station and the gas-works is sanctioned. Additional gas lands are authorized. The old capital of the Company is converted into consolidated 5 per cent. stock, transferable in £2 units. Additional capital to the amount of £100,000 is authorized, with one-third loan. The Directors of the Company may, if they think fit, annually appropriate out of revenue, and as part of the expenditure on revenue account, any sum not exceeding the equivalent of 1 per cent. per annum towards a renewal fund, which may accumulate until it amounts to 10 per cent. on the paid-up capital for the time being. The standard price of 14-candle gas is 4s. 6d. per 1000 cubic feet. The Company may provide their own telephones. The interest payable on consumers' deposits is reduced from 5 to 4 per cent. Consumers' fittings may be specified. Discounts up to 20 per cent. are allowable.

The Commercial Gas Act converts the capital stock and debenture stock of the Commercial Gas Company into stocks of other nominal amounts, but yielding equivalent amounts of dividend or interest. The conversion is into 4 per cent. stock for the original 10 per cent. capital, and into 3½ per cent. stock for the 7 per cent. stock. The debenture stock is converted into 3 per cent. debenture stock. The conversion is not to affect the amount of the insurance fund. Additional stock to the amount of £300,000 is authorized, which is issuable in the first place (at the market price) to consumers and employees of the Company. The borrowing powers are in the proportion of one-third of the paid-up capital, including premiums. On and after Jan. 1 next, the illuminating power of the gas is to be 14 candles, and the standard price 3s. 3d. Suitable burners are to be supplied and fixed on ordinary consumers' demand within two years, free of charge, and slot-meter consumers' burners are similarly to be exchanged free within a year from July 1, 1903. Power of appointment is given to employee-shareholders. The time of holding ordinary meetings is changed from April and October to earlier in the half year.

The Deal and Walmer Gas Act sanctions the purchase of certain scheduled lands, and enables the Company to raise £50,000 of additional 5 per cent. capital, with one-third loan. Existing capital may be consolidated at any time with the consent of three-fourths of the votes of the shareholders. The illuminating power of the Company's gas is to be 15 candles. Discounts up to 20 per cent. are allowable. The holding of contracts is not to disqualify persons from being Directors of the Company. Application may be made for an Electric Lighting Order; and the funds of the Company may be used for defraying the cost of such application and of carrying the Order into effect.

The Fareham Gas Act authorizes the Fareham Gas and Coke Company to acquire additional lands for gas purposes, and construct, within five years, certain engineering and harbour works thereon, subject to the survey of the Admiralty and the Board of Trade. Additional capital to the amount of £24,000 is to be raised, with £3000 by loan. The Company's standard rates of dividend are 8 per cent. on the original and first additional capital issues, and 7 per cent. on the new capital. The initial price of gas is 4s. 3d. per 1000 cubic feet. Interest at the rate of 5 per cent. is payable on consumers' deposits.

The Leyland and Farington Gas Act authorizes the Company to convert their existing share capital into 5 per cent. stock. The Company's previous Act bears the date 1863, when the capital consisted of £10,000 of original 10 per cent. shares, and power to borrow £2500. Instead of borrowing, the Company exercised the power conferred upon them by section 56 of the Company's Clauses Consolidation Act, 1845, and raised a further sum of £1400 by creating and issuing more ordinary original shares, and £1000 in 5 per cent. preference shares, with the provision that when the Company should at any time declare a larger dividend than 5 per cent. on the ordinary shares, such preference shares were to be entitled to an equal dividend. By the present Act the ordinary capital is converted into 5 per cent. stock, and the preference capital into 5 per cent. preference stock. Additional capital to the amount of £40,000 is sanctioned. Back dividends are allowed. The loan capital is in the proportion of one-fourth. Stockholders are not to have votes for three months after registration, unless the stock has been acquired by bequest, marriage, succession to an intestacy, or deed of settlement after death. The maximum price of gas is 5s. per 1000 cubic feet.

The Longwood Gas Act empowers the Longwood Gas Company to acquire the undertaking of the Colne Vale Company, and to purchase additional lands by agreement. The capital of the Company is to be consolidated, and made transferable in amounts of £1. No priority of tender for new issues is to be allowed, except that in the event of equal bids, stockholders, consumers, and employees may be given the preference. Unsold auction stock is to be offered at the reserve price to stockholders, to employees of the Company, or to consumers. The amount of premium capital is to be reckoned in determining the powers of the Company as regards borrowing, insurance, reserve, or renewal funds. The borrowing powers are one-third of the nominal amount of consolidated stock issued in exchange for the existing shares, and of new stock issues. A renewal fund may be formed out of revenue and as part of the expenditure on revenue account, up to 1 per cent. on the paid-up capital, and to 10 per cent. of the amount of such capital. The consolidated ordinary capital is to bear 5 per cent., and the consolidated preference capital 4 per cent. dividend. The initial price of gas is 3s. 1d. per 1000 cubic feet, except in that part of the township of Lindley-cum-Quarmby which is within the Huddersfield borough limits, where the price is to be the Huddersfield Corporation charge. Interest on consumers' deposits is reduced to 4 per cent. Discounts of not less than 5, nor more than 20, per cent. are allowable. Consumers' fittings may be specified. Penalties for defective supply are not recoverable in cases of unavoidable cause or accident.

The Reading Gas Act consolidates the ordinary shares and stock of the Company into a uniform maximum 5 per cent. stock, transferable in amounts of £1, so long as no holding is less than £10 of stock. Additional capital to the amount of £150,000 is authorized. Back dividends are to be limited to two years. No priority of tendering is allowed; but level bids by stockholders, employees, or consumers may be preferred. Unsold auction stock may, at the discretion of the Directors, be offered (at the reserve price) to stockholders, employees, or consumers. Premium capital is to be reckoned in with the nominal and paid-up capital for determining the amount of the borrowing powers, which are in the proportion of one-fourth of the nominal amount of the converted stock and of the existing preference capital and one-third of the additional capital. Debenture stock issues are to be under the auction clauses. Additional lands are to be acquired by agreement. The maximum price of gas supplied within the borough of Reading is 3s. 9d. per 1000 cubic feet. In the exercise of their main-laying powers, the Company are required to notify the Corporation, who are to do the reinstatement and maintenance at the cost of the Company. The whole of certain kinds of street works will be done by the Corporation. The Company must indemnify the Corporation against any demands under the Thames Conservancy Act. The Act is not to exempt the Company from the provisions of any present or future General Act relating to gas-works or public health.

The South Metropolitan Gas Act authorizes the compulsory acquisition of scheduled lands, chiefly at East Greenwich, within three years, under certain conditions in the interest of private persons, the Thames Conservancy, the South Eastern Railway, the Borough of Greenwich, and the London County Council. The London Building Acts are to apply to any structures on these

lands. Section 5 of the Company's Act of 1901 is added to by a sub-section, making the additional capital thereby authorized either £1,500,000 or £750,000 as the case may be. The scale of Directors' remuneration is altered.

The Swindon United Gas Act sanctions the transfer of the undertaking of the Swindon Gas and Coke Company, Limited, to the New Swindon Gas Company, which thereafter assumes the name of the Swindon United Gas Company. The limits of supply are the borough and other areas of the two Company, with the addition of the parish of Wroughton, Wiltshire. The payment to the shareholders of the Limited Company is to be in consolidated ordinary 5 per cent. stock of the United Company, of equal dividend-bearing value. The United Company are empowered to raise, in addition, fresh capital to the amount of £30,000, and have borrowing powers in the proportion of one-third of the amount of the whole of the consolidated ordinary stock. Consumers' fittings may be specified. The Swindon Corporation have the option of purchasing the undertaking within four years from the passing of the Act.

The West Ham Gas Act empowers the Company to acquire additional gas lands, and consolidates the capital as uniform 5 per cent. stock, transferable in sums of £1, with additional stock to the amount of £450,000, and one-third loan. Premium capital is to be reckoned in the determination of the borrowing powers and the amount of the insurance fund. The borrowed money is to be obtained as debenture stock, under the auction clauses. The standard price is altered to 2s. 11d. per 1000 cubic feet for 14-candle gas; "and in making tests for illuminating power, the gas shall be burned at such a rate as to yield the maximum light for which the burner for the time being used in making such tests shall be designed." Gas supplied through prepayment meters is to be charged at the ordinary price, with a calculated addition of 10d. per 1000 cubic feet, to include the hire of the meter and the fittings, cost of collection, and any other expense. This surcharge is to be open to revision by the Board of Trade. Where a prepayment meter is used without fittings, the charge for hire is to be 10 per cent. per annum on the cost. A fresh situation is prescribed for the statutory testing-place.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 1032.)

THE Stock Exchange had on the whole a more cheerful time last week than that which its predecessor had afforded; but still, the change was partial only, and did not extend to all departments. The cloud brooding over the United States caused the American market to be gloomy; and our Home Rails were again weak. Consols and the gilt-edged division had the best of it. Business in the aggregate was small; and the Jewish holiday pretty well killed it towards the end. In the Money Market, there was marked ease, with an abundant supply to meet all possible requirements, and discount rates were lower. Business in the Gas Market was quieter, on the whole, than it had been the previous week. At times it would brighten up and look as if about to be active, and then would fall back into its quiet state. Changes of quotation were few and slight, much more so than might fairly have been expected; for the general tendency was decidedly favourable, and it really looked as if people were beginning more clearly to recognize that good gas stocks are worth buying at present prices. It is perhaps a pity that they do not always know which are best to buy. In Gaslight issues, the ordinary was dealt in on a fairly extensive scale, and showed marked buoyancy. From a transaction registered on the opening day at 87¾, it slowly and steadily rose till on Friday it changed hands more than once at 90—the best figure it has reached for some time past. The quotation, however, was only advanced one point. Of the secured issues, the debenture was rather active; but none of them could touch anything better than middle prices. South Metropolitan was moderately active, and improved upon the position it held at the close of the previous week. The closing mark at the end of the week was 123½, and the quotation improved a point-and-a-half. In Commercials, a transaction in the old stock at top price sent the quotation up a point; but the new stock was unmoved. In the Suburban and Provincial group, there was hardly any business at all in the London market, and quotations were left standing. In their local Exchanges, however, Liverpool "A" and Newcastle each had a slight advance. The Continental Companies were quiet. Imperial was not quite so firm as in the previous week or two, and Continental Union preference was put down rather freely. Of the remoter undertakings, the Buenos Ayres quotation was drawn in to a half margin. In the Water Companies, the only change was a fall in New River.

The daily operations were: Very moderate business in Gas on Monday. Commercial old rose 1, and South Metropolitan ½. Tuesday was rather quieter. Gaslight ordinary and South Metropolitan rose 1 each. Wednesday was a little brisker, but nothing changed. Thursday was very quiet. Union preference fell 4½. Friday was the most active day of the week. Tuscan debentures rose ½. Saturday was almost stagnant in Gas. In Water, New River fell 5.

ELECTRIC LIGHTING MEMORANDA.

"Free Wiring" in Court—Importance of the Wiring Question—Its Difficulties—The Chief Obstacle: Cheap Gas Light.

THE case in the Lambeth County Court reported in our "Legal Intelligence" last week drives another nail into the coffin of electric light and "free wiring" agreements. The facts are well worth the attention of every gas manager confronted with this specious method of extending the electric light business; but, of course, it is not a matter that they can deal with officially, beyond seeing that those whom it may concern are kept informed of the nature of the snare. It is really a thing for Ratepayers' and Tradesmens' Protection Societies to take cognizance of, especially where this "free wiring" trap is set with the connivance of the local authority, as is often the case. The instance in point is typical. A Camberwell tailor was beguiled into signing an agreement for three years, under which he was left without any option as to continuing or abandoning the use of the electric light and fittings. He duly discovered that the amount of light he was able to get was insufficient for the requirements of his business, while it cost three times as much as gas. Therefore he wished, after the first quarter's experience, to give up using the electric light and return his meter; but, of course, the suppliers would not hear of that. They said that if the number of lights fixed was not enough, the unfortunate tradesman had better have more; but this he could not afford at the price. Meanwhile, the Company insisted upon being paid according to the terms of their agreement. The Court had no option but to give judgment in their favour, but deprived them of costs in order to mark the one-sidedness of the bond. All the same, it is impossible to blame the Company unreservedly for requiring the return of the money they had expended. Their undertaking is not a philanthropic enterprise, and they had performed their part of the contract. They would soon be in the Bankruptcy Court, instead of the County Court, if it were left open to every co-signatory of a wiring agreement to pay or not, as he might please. Their money is spent beyond recovery except in the covenanted manner. The Court therefore was doubly right—first, in upholding the agreement, and, secondly, in expressing the wish that people would refrain from signing such agreements. If they did not, of course, there would be an end of the "free-wiring" delusion; and this would be a very good thing.

It is hardly necessary to lay stress upon the importance of this question of house-wiring to suppliers of electric light. Their case is on all-fours with that of the early gas companies, who had to cope with a similar lack of means on the part of the householder to avail himself of the service they were prepared to render. It was for this reason, chiefly, that, on its introduction into a district, gas was regarded as a luxury for the well-to-do. It is chiefly on account of the fittings that go with it, that the prepayment gas-meter has made such headway of late years. And the easy expansion of gas companies' business in ordinary meter supplies is largely due to the unorganized co-operation of that much-maligned personage, the speculative builder, who years ago found it conducive to the sale and letting of eligible residences to advertise them as having "gas and water laid on." He did not do this out of friendship for the gas or the water company; and it is to be feared that the officers of the former were content to perform their part of the work, which consisted in making the service connection and fixing the meter, just as though gas were as necessary to life as water. This easy state of things no longer prevails in many, and an increasing number of districts. The speculative builder is learning to leave out the gas pipes and provide electric light wires instead. Meanwhile, the ingenuity of the cleverest and most hardly-pressed tribe of mechanicians extant is being concentrated to solve the wiring problem as it is presented by existing houses, well knowing that the prosperity of their trade depends upon their success. Simple "free-wiring," as it was originally tried, has proved a failure. Local authorities are not permitted to sink their money in domestic fittings. Companies can do so if they like, and local authorities can enter into arrangements with contractors for doing such work; but the difficulty of securing a profitable return, or of getting the money back, is practically insurmountable. The original plan of putting an additional penny or halfpenny on the price of the unit to pay for the fittings, breaks down through its inequality, and also because it makes what is already dear look exorbitantly so. The alternative plan of separating the charge for fittings from the light bill and spreading the former over a term of years, is open to many objections, as the case in point shows. It is, besides, impossible to adjust it to removals. It is to be noticed that in all this traffic there is no pretence that the wiring is "free" in substance and in fact. If it were, there would be an end of the difficulty; but it is far otherwise, and the least concession to the supremacy of truth and the cause of fair dealing that those in the business could do would be to drop the word out of the connection. Much of the objection to these wiring arrangements would disappear if they were not put forward under this false pretence.

There remains, of course, the crying necessity for doing something of a more honest and straightforward nature to enable electric lighting to be used by those who would like it, but cannot have it at any price by reason of the lack of wiring. It is

quite futile for local authorities in possession of electricity supply undertakings to drop the price of the unit below what is fair and reasonable, in the hope of turning a loss into a gain, if the ordinary tenant of a house cannot get it laid on, for obvious reasons. The cables are already carried past hundreds of doors in hopeless quest of distant employment, and nothing is being done to tap the source of income which lies by the way. Partisans of electric light need not flatter themselves that if this obstacle were overcome gas for lighting would fall into desuetude. It pleases them to "make believe" in this sense; but incandescent gas, where plenty of light is wanted, is, and will probably remain, a larger obstacle than even the cost of house wiring to the illimitable expansion of electric lighting of which its admirers dream. Indeed, if these enthusiasts would only see the matter even as the public do, one of these obstacles would be perceived to back up the other. People will always in the long run be willing to spend money to save money. The history of the incandescent gas-light itself supplies a proof of this observation, if proof were needed. It began to make its market when every complete burner cost about a sovereign, though flat-flame burners could be had for a penny apiece. If the incandescent electric light were more effective than gas, or cheaper than gas, nothing in reason that the wiring or fitting might cost would stand in the way of its general adoption. When will electric light partisans recognize this cardinal truth of the situation which the competition of incandescent gas lighting has created for them? Perhaps at the time when they agree once for all to drop the pretence that in making up their trade circulars they can take the obsolescent flat-flame gas-burner consuming 5 cubic feet per hour for the basis of their proffered comparisons of the cost and effect of gas and electric light. These comparisons are worse than useless to those who make them. They blind the eyes of their framers to the reality of things in the world in which they must make their living. The expense, trouble, and general bother of having a house wired would not deter the occupier if he could see anything to be gained by it besides the gratification of a fancy, which might not prove lasting. It is more than the average person with less money than he could easily spend will face, when he is met with the prospect that after he has got the electric light it will probably cost considerably more than gas. This difficulty goes to the root of the matter. Let it be taken for granted that there is not, nor can there be, any such thing as the free wiring of a house for electric light. Nobody can get something for nothing in this world. Reduce it as much as possible, still the cost is positive; and not a trifle for the man who wants every penny of his income. Then, on the top of that, let it be understood that indulgence in this luxury is going to add to his household expenses; and where is the motive for his doing anything of the kind?

THE OWNERSHIP AND CAPACITY OF RAILWAY COAL TRUCKS.

One of the incidental questions of the British gas industry is that of the railway transportation of coal and coke, which can be expressed in the single word, "waggons." Some time ago, mention was made in these columns of the new aspect which was being put upon this question by the inclination of British railway managers towards the adoption of larger coal trucks, such as are commonly used in America; and we gave the warning to designers of retort-houses and coal-stores to look ahead, and make such provisions that they might not find themselves pinned to the existing standard size of trucks. Since this warning was given, the advance of railway opinion in the indicated direction has been rapid. A feeling of uneasiness in respect of the future value of their property has been growing and intensifying among railway shareholders, who are being confidently assured by some prophets of evil, that the days of dividends on the ordinary stocks of most British railways are numbered. It is averred that during the last quarter of a century the enormous capital expenditure upon these lines, under the nominal control of antiquated and incapable directors, has gone for very little increase of earning capacity. There are exceptions, of course, which it is not necessary to specify in connection with this argument. Generally speaking, however, the cry has arisen for something to be done immediately in the way of satisfying the demands of the industrial community for cheaper railway carriage, and also of increasing railway earnings. In this connection, the question of the carrying capacity of coal waggons is a pressing detail for railway managers to consider.

The presentment of the problem has to start with the fact of the existing four-wheeled coal-truck. About this common object of the British railway, there is no room for dispute. It is as material as anything in the universe, and apparently as immutable as a star in its course. From it to the standard 60-ton box-truck of America the distance is immense. As with all such comparisons, the really important consideration is not the mere amount of the difference between the two points, but whether it is a fixed or a changing quantity, and if the latter, in which sense is the alteration progressing. The moment one poses a question of this character, the perception awakens to the immensity and complexity of the mass of detail which enters into it. No great mastery of the principles of railway carriage of goods, including minerals, is required to enable an inquirer to conclude that it is practically as easy, and not much more expensive, to haul a full truckload of 60 tons, as, and than, to haul a truckload of 10 tons. That is so, all things being equal, and starting with the alternatives both open. But having made up one's mind to this, and further accepted the obvious economical advantages of the larger units in the case, the next thing to be considered is whether, and how, these could be adopted anywhere in place of an existing use of the smaller units. Nothing more easy, say some "doctors" of the railroading faculty—nothing less practicable under the actual conditions, say others. At the present time, the Indian Government and the English Board of Trade are understood to be studying reports of experts who have been to the United States with the express purpose of seeing how the large coal waggons answer there; and several English railway companies have provided themselves with experimental 30-ton and 40-ton coal trucks. Supposing the experiment to prove a success, therefore, and the general conclusion as to the desirability of its indefinite extension to be the outcome of the Government inquiries above mentioned, the probability is greatly in favour of pressure being exercised with the object of extinguishing the four-wheeled coal-truck at present in use throughout these islands.

There is, however, in the way of a general change of this nature, as regards the railway carriage of coal in Great Britain, a very formidable obstacle of a financial or administrative, not a technical or mechanical, kind. This is the private ownership of the coal trucks at present in use. It is one of the innumerable anomalies of English affairs, which it is quite futile to approach in the light of foreign experiences. Whether the technical difficulties in the way of the conversion of the common British four-wheeled coal truck into a copy of the American box 60-ton truck on bogie carriages are little or big, the fact which has to be regarded as ruling the situation is that, with two exceptions, our railway companies do not own the coal trucks, and have no power to deal compulsorily with those who do. This fact has been spoken of as "the millstone which hangs round the necks of all English railway companies, except the Midland and North Eastern;" and it has no counterpart in any other country. The coal carrying trade of the country is therefore done with "private" waggons, numbering upwards of 500,000, and representing on a moderate estimate 45 per cent. of all the railway trucks in use in the country. These trucks are owned by more than 4000 different proprietors, who are banded together in the Association of Private Owners of Railway Rolling Stock. Moreover, a considerable number of these waggons are not really the property of the traders who use them, but are hired from proprietors who maintain them and let them out at an inclusive rate. Thus there is an interest of middlemen behind middlemen, so to speak, all living out of profits which might be earned by the railway companies but which the latter, for various reasons, have allowed to slip through their fingers.

Naturally, all sorts of consequences follow from this peculiar British institution. The private owners of railway trucks have powerful parliamentary influence, which, being acute men of business and not mere ornaments on the boards of companies whose affairs they do not understand, they are careful to make effective. In actual railway working, the collection, returning, and sorting-out of the private waggons to their particular homes when empty entails enormous expense. Then this private rolling-stock is either poor and shaky, or is unnecessarily heavy—in both cases being a source of trouble and expense to the railway company. In a word, as an evidently experienced writer on the subject to "The Times" declares, "the private waggon stands in the way of all improvements in the methods of conducting the mineral traffic of the country, and it must, therefore, be abolished." This is all very well as a counsel of perfection; but how is it to be done? The only reasonable suggestion that has been put forward in this connection is that the railway companies should combine to condemn all private waggons over 10 years old, and take over the rest at a fair price—no fresh ones being allowed on their lines. This, again, sounds fair enough; but there are other considerations that would require to be discussed and settled upon an equitable basis before any such drastic alteration of the existing system of railway works, in the minerals department, could be entertained.

To name only a few: Some guarantee would have to be given that the railway companies would always keep, and produce on demand, an adequate number of trucks for the traffic. Many railway companies do not possess a single coal truck, and would hardly know what to do with it if they had it. The requirements of the gas undertakings alone are extensive, peculiar, and imperative; and it is not "for fun," or even for running profit, that the coal agents provide themselves with the necessary rolling stock for carrying out their engagements. Fancy a town on any of the southern lines dependent upon the railway company for trucks to carry gas coal! The company would need to reorganize in order to do the business for which they have no facilities. It is not merely the provision of trucks. That would be a serious matter for many of the companies that have been mismanaged for so long in every other department; but it is not the whole of it. What remains over and above the rolling stock equipment amounts to a big business. Besides, there are some American legends of railway management which are not pretty to hear. One has read of "rings" and "combines" being formed and worked in the interest of

particular trades and traders. It is not necessary to suppose that patent unfairness of this kind would be permitted in English railway working; but it is quite possible that trucks might gravitate in some directions more easily than in others.

We should much like to hear the opinions of one of the much-abused owners of private coal-trucks on the general question; but we have not much hope of getting such a communication. Herein lies one of the great differences between English and American business ways, which make it so difficult for the public to judge them on equal terms. Whatever the American does, be it the building and running of a 60-ton coal truck, or anything else, is straightway advertised in the newspapers, and so all the world is acquainted with the fact. The English trader or carrier of goods does his business in his own fashion, and says nothing about it. Consequently, the newspaper-reading public, through being kept so well advised as to what Americans are doing, and seeing nothing about the every-day performances of their own countrymen at home, are apt to make too much of the one, and think too little of the other. In connection with the present subject, there must be a solid body of English expert opinion hidden away somewhere. It would be of advantage to hear what it holds in respect to the twofold question of whether the private ownership of railway coal trucks should or should not be abolished in the public interest, and whether the existing four-wheeled coal truck could be advantageously superseded by a bogie truck considerably larger. These are matters of much importance to the gas industry of the United Kingdom, and the amount of trustworthy information available in respect to either is so small that it can hardly be said to exist for public use.

OBITUARY.

We regret to learn of the death, on Sunday, the 5th inst., at Portslade, Sussex, of Mr. JOHN FALKNER PADDON, of Drymma, Neath, second son of Mr. John Birch Paddon, Chairman of the Brighton and Hove Gas Company.

"Het Gas" reports the death, on the 5th ult., of Mr. C. HODGKINSON GRAY, Sub-Manager of the Haarlem works of the Imperial Continental Gas Association, where he had been engaged for nine years. He was only 42 years of age.

The death was recently announced, at the advanced age of 83, of Mr. JOHN IMRAY, a member of the firm of Messrs. Abel and Imray, patent agents. The deceased gentleman was the medium, in his professional capacity, of introducing to public notice many important inventions connected with the gas industry.

It is not a little remarkable that within a few weeks of the publication of the article on "The Hislop Family of Gas Engineers" (*ante*, p. 737), news should reach us of the removal of a member of that family by death. According to an announcement which appeared in "The Times" last Tuesday, Mr. JAMES ROBERT HISLOP, eldest son of the late James Hislop, and nephew of Mr. George R. Hislop, of Paisley, died suddenly on the 1st inst. at Pará, where he held the position of Engineer and Manager of the gas-works. He obtained this appointment not very long after the death of his father in July, 1888.

PERSONAL.

We learn from the "American Gaslight Journal" that Mr. BANKSON TAYLOR has resigned the position of local Manager of the New Orleans Lighting Company, and is succeeded by Mr. THOMAS D. MILLER, who has had control of the Dallas (Texas) Gas and Fuel Company. Mr. Miller has lately completed his term of office as President of the Western Gas Association; and he has rendered signal service in connection with the development of the South-Western Gas, Electric, and Street Railway Association, of which he is Treasurer.

Mr. C. E. CHRIMES, having completed his fiftieth year's connection with the firm of Messrs. Guest and Chrimes, of Rotherham, the employees and their wives, numbering 600, were entertained to a tea and *soirée* at the Rotherham Drill Hall last Tuesday, in honour of the event. During the proceedings, Mr. W. Eskholme, the second oldest employee, on behalf of the workpeople, presented Mr. Chrimes with a sterling silver *repoussé* dessert service. Mr. Chrimes returned the thanks of himself and Mrs. Chrimes for the gift, and said they would especially value it as an expression of the feeling prevailing between employers and employed.

An interesting gathering, marked by the utmost cordiality, took place last Friday evening at the Queen's Hotel, Birmingham, when Mr. CHARLES HUNT was presented with a pair of silver candle-sticks, bearing a suitable inscription (*en suite* with the rose bowl recently given him by his works' staff and workmen), and three silver inkstands, which had been subscribed for by many of his former and late colleagues at the offices and works of the Birmingham Gas Department. The gifts were accompanied by an address expressing regret at the severance of Mr. Hunt's long connection with Birmingham, the admiration felt by the signatories (in common with the profession generally) for the qualities which had enabled him to attain such a leading position in the gas industry, and dwelling on the pleasant personal relations which had existed between him and themselves.

CHARLES GANDON.

How often has this name been written for publication in the pages of the "JOURNAL" while he who bore it was full of activity! but on no occasion has it been penned with such sincere sorrow as now. Last Wednesday, Mr. Charles Gandon passed from the joys and cares of this world at the house at Brockley where he has lived since his retirement; and widespread will be the regret, though his intimate connection with the gas profession ceased five years or so since, that he is no longer in our midst. It has been well known among his friends that he had been suffering for some time from a painful and insidious disease; but, notwithstanding, so great was his energy that until near to the end he insisted on performing those directorial duties which kept his name, during the few years of retirement from direct official service, linked with the gas industry. On the 30th of September, he was in London for the last time; on the 8th of October he had passed away; and last Saturday he was laid to rest in Nunhead Cemetery, in that quiet, unobtrusive way which—characteristic of him in his professional life and work—would have been of his own choice.

Mr. Gandon was born on June 13, 1837. His school days over, he was articled to Mr. Henry Palfrey Stephenson; and, as we have since seen, the professional course of the master did much in shaping the future path of the pupil. During the succeeding thirty years, the business lives of the two men were closely allied. Mr. Stephenson's early practice was in dock and railway engineering; but, in the fifties, he drifted into gas work. With Mr. Gandon as his assistant, in 1858-9 he constructed among other gas-works those at Naumburg, Ludwigsburg, Zeitz, and Tilsit, in Germany, and probably it was partly the Continental residence in those years of the subject of this memoir that developed, in such remarkable degree, his known linguistical powers. After his Continental experience—not only in gas construction but in railway and bridge work—Mr. Gandon was appointed to an assistant engineership on the Great Northern Railway; but, before long, he cast in his lot definitely with the gas industry by becoming the Engineer and Manager of the Ottoman Gas Company, Limited. Though he took this step, he never, throughout his life, lost interest in the progress of those branches of engineering in which he was first trained. While at Smyrna, Mr. Gandon served the Company well and with ability; and he learned there the lesson of how much the fortunes of an English Company in a foreign land depend upon the tactful resource of, and influence cultivated and possessed by, the local Manager. His excellent work earned for him the confidence of the Company's Board; and when he finally settled in England, they honoured him and benefited the concern by electing him a member of the directorate, and so gained the advantage of his knowledge of the Company's affairs at the seat of operations. During his residence in Smyrna, he conferred great benefit on the town by pointing out to them, and not only so but proving, the way by which one of the necessities of life then urgently needed could be procured. The town was almost devoid of water; and he expressed the opinion, from the formation of the surrounding country, that an abundant underground supply existed. His prediction was met with considerable ridicule; but, in spite of this, he put his view to test, and had the satisfaction and reward of tapping an excellent supply of water. This discovery has probably had a greater beneficial effect on the town than any other; for what progress can a town make without this prime necessary of life? To-day in Smyrna, Mr. John Gandon (who is now managing the works of which his father formerly had charge, and who is on a visit home) tells us, artesian wells, of which his father sunk the first, may be counted by thousands.

From Smyrna, Mr. Gandon migrated to Bombay, to take control, as Engineer and Manager, of the Bombay Gas-Works, which, as readers are aware, are also the property of an English Company. As in the case of the Ottoman Company so in this, his faithful and politic work in Bombay brought to him an invitation, a few years after, to take a seat at the Board; and his colleagues have, time and again, acknowledged that his counsel has been invaluable. But before this latter event, we find his sphere of labour changed to Pará, where he took over the management and engineering work of the Gas Company, which was also controlled from London. His service with this Company ended his great and varied experience in gas-works administration in foreign and widely separated parts of the globe. But that experience, as already shown, was devoted, with good purpose and result, to the direction (of all directorial work the most difficult) from home of the undertakings that he served officially abroad.

In taking the engineerships of the Bombay and Pará Gas Companies, the current of Mr. Gandon's life still flowed with that of his first master—Mr. Palfrey Stephenson; for this gentleman was a Director of both concerns. On Mr. Gandon's return to England, their connection was again brought into even more intimate relationship. Mr. Stephenson, who had been associated with Sir Erasmus Wilson and other gentlemen in the formation of the Crystal Palace Gas Company, was then, as he had been from the commencement, a Director of the concern—for some years, too, the Chairman—and, in 1876, he had the pleasure of seeing his old pupil appointed as the Company's Engineer. The undertaking was then only a comparatively small one; but when Mr. Gandon

resigned the office in 1897, he left the Company standing well among the large leading gas concerns of the country. His engineering work during those 21 years, and his interest in, and views on, all matters associated with the profession are so well known and recorded that they need not be specifically dealt with here; but there is one little incident that comes specially to memory. It was towards the end of the eighties that gas labour in the Metropolis and the suburbs was in great ferment; and then it was that Mr. Gandon's tact and firmness, and the esteem with which he was regarded by his men, averted a threatened strike at the Crystal Palace Gas-Works. Immediately afterwards, the men spontaneously acknowledged their high appreciation of his counsel and friendship towards them by presenting him with a fine piece of silver plate, which has been cherished—not as a memento, for memento has not been needed, but as an emblem of the sunshine that followed the cloud, and of the kindly feeling that existed between men and chief. After his retirement from the post of Engineer to the Company in 1897, Mr. Gandon did not undertake professional work. But his connection with the industry was maintained by his membership of the Boards of the Bombay Gas Company, the Ottoman Gas Company, and the Woking Water and Gas Company; and, from his election to the time of his death, he held the full confidence of the shareholders of these Companies.

Nothing more need be written of his official work; but a biographical sketch of the life of Charles Gandon would suffer incompleteness without a reference to his connection with the associated technical work of the profession. First (adopting the chronological order) it should be recorded that Mr. Gandon was admitted an Associate Member of the Institution of Civil Engineers in 1867, and in 1881 he was raised to the status of member. Of the old British Association of Gas Managers, he became a member in 1876; and it was his unenviable fate to become the President of the same body, under its new name of the Gas Institute, in the most critical stage of the trouble that shook (in the eighties) the foundation of the unity of the organized gas profession, and ended in its cleavage. This was in 1888. The manner in which he conducted the proceedings—his judgment and firmness, tempered by a manifest impartiality—was admired and recognized by all. Strange it is, as we look back and at the present, that he should have been President in the year which was followed by the rupture; and that, as he is laid to his final rest, unity appears—stay, may we not write "is"?—nearer at hand than it has been since that memorable meeting. His presidential address delivered on the occasion testified the vast range and variety of his interests as a technologist. Prior to that year, he had served the old Association and the Institute well in the minor (in degree of dignity) but yet important offices. His close adherence to the Southern Association and its work is well known. In 1882, he occupied the presidential chair, and laboured assiduously to maintain the Association's prestige.

For the Society of Engineers, Mr. Gandon held an almost affectionate regard, as did also Mr. Palfrey Stephenson, who was one of its founders. This fact may have influenced the younger man, and tightened the ties that bound him to this polygenous and old-established engineering Society. As in the special organizations of the gas profession, so in this, he took his share of the work of government and direction; and he was called upon to preside over the members in 1885. Three times President of technical societies in one decade is a respectable record for any man. His address to the Society of Engineers on this occasion brought to the surface the critical pleasure that he continued to take in those branches of engineering to which his mind had been first directed in his pupilage days. Four years previous to his presidency, he contributed to the Society a paper on "Gas-Engines," which even now may be read with interest and advantage by those who desire to become acquainted with the essence of the knowledge on the subject some twenty years since. Hartley, Somerville, and Spice—men of note of the time whom the younger generation of gas engineers of to-day hardly knew or never saw—were then among those who took part in the discussion of the paper. Verily, time flies! Mr. Gandon was also a member of the Institution of Gas Engineers; and the industrious manner in which he laboured in the laying of the foundation of that body, and subsequently in promoting its interests, are fresh in memory. His prepared contributions to the various organizations were few in number; but as a debater on technical subjects, he was ready and 'cute. Plain in speech, crisp in expression, practical in view, and never hesitating in adverse criticism if propositions did not coincide with his experience, he was always listened to with respect and pleasure; and his reported utterances were read with equal enjoyment.

Such was the man in his professional walks whose death is to-day deplored; and to his widow and family—five sons and three daughters—we, in unison with numbers of friends in the gas industry, express the deepest sympathy. Of the sons, be it noted, four have followed their father into the gas industry—John is Engineer and Manager to the Ottoman Gas Company; Charles is Assistant at the Imperial Continental Gas Association's works at Aix-la-Chapelle; Herbert is Manager of the Neepsend works of the Sheffield Gas Company; and Harold is an assistant at the Antwerp works of the Imperial Continental Gas Association. The fifth son—Philip—is identified with another branch of engineering in Manchester. All of the sons, we believe, were able to reach home in time for the last solemn rites on Saturday.

COMMUNICATED ARTICLES.

THE EARNINGS OF A TON OF GAS COAL.

By C. E. Jones, Assoc. M. Inst. C.E.

This inquiry is herein limited to coal subjected to destructive distillation in the ordinary manner in the works of gas companies in the United Kingdom; and the net profit per ton of coal carbonized may be considered as dividend, or cash earned during the year legally applicable to divisible purposes amongst the shareholders. This amount varies considerably in different undertakings; and attempts to arrive at uniformity by systemization appear to be hopeless. Enormous and perplexing differences prevail between apparently similarly circumstanced companies; and such extraordinary results are obtained in the endeavour to find suitable data for intelligent classification, that the investigator meets with little encouragement, and is often disposed to abandon the attempt.

Treating the companies in groups proportionate to their carbonizing capacity appears to the writer to offer as few, or fewer, objections than any other; and on this principle he has proceeded, adopting the "ton" as the factor for division and comparison, and using the published accounts of the companies themselves. To technical readers it is scarcely necessary to point out the many causes that influence the amount of net profit as known in gas-works, such as the cost of the raw material, the selling price of the staple product and residuals, markets and trade facilities, rate of wages, character of the district, and the nature of the supply—whether a compact and densely populated or a scattered and sparsely populated area of supply, stagnant or declining, or an expansive and growing district, residential, agricultural, industrial, and manufacturing, possessing powers of progressive development and commercial advantage. None of these considerations, nor yet the distribution of profit or its application, are taken into account at this stage in the article; they will be considered farther on.

Contrary to the received opinion, small companies are capable of earning more profit per ton of coal carbonized than their larger brethren; they appear to be as prosperous as the gigantic undertakings. The provincial manager of a "small" works has no need to take a back seat when arraigned before his bigger Metropolitan brother; his results comparing favourably with those of large works with their manifold advantages in output, machinery, and staff organization, and putatively more skilful management. It may be that the manager of the lesser undertaking exercises more personal supervision over details than is possible in the case of large works. But, whatever the cause, the fact remains that small works manage to get as good a profit per ton as those of much larger dimensions. A reference to the accompanying table shows this at a glance; and group B, or works not using more than 1000 tons per annum, heads the list of profit-making concerns. Up to 10,000 tons a year there is, *primâ facie* at all events, an advantage in profit-making.

Table *showing the Net Profit Earned per Ton of Coal Carbonized by the Gas Companies in the United Kingdom.*

Group.	Coal Carbonized. Tons.	Profit Earned per Ton. s. d.	Yearly Consumption of Coal. Tons.
A	8,219	9 10·04	Not exceeding 500
B	21,074	13 0 72	,, ,, 1,000
C	105,249	10 1·54	,, ,, 2,000
D	235,449	10 1·26	,, ,, 4,000
E	256,080	9 11·06	,, ,, 6,000
F	223,858	11 5 82	,, ,, 8,000
G	179,642	10 6 32	,, ,, 10,000
H	332,332	8 7·30	,, ,, 15,000
I	833,428	8 10·41	,, ,, 30,000
J	1,280,891	7 8·97	,, ,, 100,000
K	4,676,884	9 5·89	Exceeding 100,000
—	8,153,106	—	—

Causes Affecting Profit.

Management.—This (which for our present purpose may include manufacturing, purifying and distributing charges, or, broadly, the cost of producing and selling the purified article) does, and as may be expected will, vary with local conditions and facility of manipulation; but, with some exceptions, the cost of production does not offer much room for criticism, taking the industry as a whole. Room for improvement in certain units will not be denied; but the diffusion of knowledge by various means has assimilated practice and promoted economy, with the result that extreme disparity is disappearing.

Cost of the Raw Material.—This is an important item; but it is not the all-in-all some appear to think, since more profit is made by works whose coal bill is high than by works actually situated in the midst of the coal measures of the country. This may seem

paradoxical, but it is a fact; and it accords with the writer's experience. Where coal is "cheap," coke is profitably unsalable, or a drug in the local market. Gas coke, except for certain uses, cannot compete with cheap coal, although much more might be done to popularize coke than is attempted by gas companies.

Selling Price of Gas.—The price of light is a comparative matter from the consumer's point of view, and the cheapest and most convenient illuminant will surely survive. In this connection, the Darwinian doctrine of the "survival of the fittest" holds good, and relative cost will determine which illuminant has the preference, sliding-scales, maximum charges, and statutory enactments notwithstanding. Commercially and financially, the strongest gas companies are those who sell gas cheaply, and effectively compete with rival illuminants.

Leakage and Bad Debts.—These are a permanent drain on profits; and while the former is less than it used to be, the tendency of the latter is to grow. Its extirpation is probably impossible; but it should be remembered that every "bad debt" is an injustice to the paying and honest consumer, and every means should be tried to eliminate the objectionable item from the accounts, or reduce it to a minimum. The deposit system offers encouragement here, provided that reasonable interest is allowed on the sum deposited, and not otherwise. The prepayment meter is also a means to lessen the number of doubtful or dishonest gas consumers. It also provides ready or floating capital to carry on the business, which, to companies in a tight place in regard to capital, is a positive boon.

Local Rates.—These ever-growing burdens influence profit, and without doubt are unequally shared among industrial concerns; gas companies being rated up to the hilt. Assessment Committees have little or no respect for non-combatants, and apply the squeezing process to all industrial concerns. notably gas and water and railway companies. The putting up of the rates is a science; and acquiescence on the part of the rated is taken as a sign of weakness and that the undertaking is undervalued. If, to save cost and trouble, a company submits to the increased assessment, it will not be long before the squeezing process is repeated *ad infinitum*. Collieries usually pay a poundage or tonnage on the output of coal, railways at per mile, and it would be more satisfactory and equitable if some arrangement of local rates could be arrived at on the basis of coal carbonized or gas sold. At all events, "Quarter Sessions" usually take a much more business view of rating gas-works than Assessment Committees, which are composed frequently of tenant farmers, house property owners, local tradesmen, and popularity seekers, who "go for" joint-stock enterprises with zealous delight. Over-rated companies should appeal to Quarter Sessions, even if they (which is generally the case) are the largest ratepayers, and have to pay the major part of the Committee's costs, as well as their own. By non-success,or even partial success,at the Court of Quarter Sessions the Assessment Committee suffer a loss of popularity, and get into bad odour with the ratepayers, who, to do them justice, deprecate "appeals," and think the business can be settled without resort to such proceedings. But as long as valuers are paid on whatever increase in the valuation they can sustain, and not by salary, dissatisfaction will always prevail, and the incidence of taxation remain a standing grievance and chronic hardship to many industrial concerns besides gas undertakings.

A glance at the counties owning the highest profit-making gas companies in the United Kingdom may be interesting to many, as it locates the most profitable towns for selling gas. The premier position is held by fashionable towns and seaside watering-places of the popular character. Thus the Isle of Wight, in the aggregate, earns 14s. 10·53d. per ton of coal carbonized; Cumberland, Merioneth, Montgomery, Rutland, and Westmorland give a mean of 14s. 5·30d.; the county of Berks, 14s. 4·56d.; Sussex, 14s. 4·41d.; Middlesex (without the county of London), 13s. 7·77d.; Derbyshire, 12s. 11·87d.; Essex, 13s. 9·92d.; Dorset, 12s. 1·61d.; Cheshire, 11s. 8·23d.; Leicester, 11s. 7·82d.; Surrey, £11s. 7 56d.; Kent, 11s. 2·14d.; Norfolk, 10s. 11d.; Lincoln, 10s. 9·36d.; Lancashire, 10s. 9·07d.; Cambridgeshire, 10s. 7·62d.; Carnarvon, 10s. 7·58; Hereford, 10s. 7·44d.; Flint., 10s. 4·50d.; Yorkshire, 10s. 4·47d.; Cornwall, 10s. 4·12d.; and Hertfordshire, 10s. 3·34d. The mean of the few companies in Scotland and Ireland is 10s. 0·51d. Denbigh and Glamorgan and Brecknockshire and Carmarthen similarly, 9s. 11·21d.; Staffordshire, 9s. 9·20d.; Oxford, 9s. 5·06d.; and Shropshire, 9s. 3.31d. The following counties are nearly in line, Somerset heading the list and Warwick a good second: Devon, Durham, London, Monmouth, Northumberland, Nottinghamshire, Somerset, Warwick, Wilts., and Worcester; the mean of the ten counties being 8s. 5·76d. Gloucester, Hampshire, and Northampton average 7s. 4·93d.; and Pembroke and Cardigan, 6s. 0·56d.

Dealing with individual works or towns, the divergence is enormous, and requires more than the stereotyped phrases of presiding chairmen to explain away. That the low profit of some large towns suggests bad management and not a low selling price is evident; but enough has been said to prove that the industry is possessed of an earning power not to be underrated by investors, and to teach that, with one or two insignificant exceptions, all gas-works are dividend-paying concerns—and at present there is abundant evidence that they will remain so—and in the battle of the lights coal gas is not likely to be displaced by any of its present competitors, while it can earn the profit per ton shown to be the case in this brief article.

AMERICAN SPEECH AND WRITING.

By An American Engineer.

The article on "Gas Matters in the United States" in the "Journal" for Sept. 9 (p. 682), moves me to write a few words which you may publish or not as may seem best to you.

Everything considered, it is a questionable matter to bring up "the boastfulness of the Yankee speech, &c.," and hark back to the time when Englishmen who had settled in America, in parts which now form the United States, stood shoulder to shoulder with their countrymen across the water, to bravely fight, and generally whip, a common enemy. But for the folly, stubbornness, lack of wisdom, and injustice of an English King and his Privy Council, it is quite likely that there never would have been any "United States of America;" and that there are, is not, let me remark mildly, due to boastfulness. "Ah; see! there they go again" you may remark. But the King and his Privy Council were not altogether approved by some of the best of England's statesmen of that day; and there were many good, true men in England who were never traitors to their own country, but who yet sympathized with the Colonies—which, let it again be remarked, might still be a part of the British Empire.

To one who has seen and closely observed both, there seems to be not a great deal of difference between the Englishmen at home—who, more fortunate, perhaps, than those of their countrymen who, of their own volition or through force of circumstances, were obliged to seek homes abroad—and the latter, or their descendants; and the writer has found very much to admire in both. It is a great pity, if true, that the British mind should enjoy the occasional "roasting" of the people (now a great nation) who owe their existence as such, under Divine Providence largely to England, and whose tendency—that of the ruling majority, certainly—is friendly to the parent people.

It is pleasant to believe, and is at this time beyond any doubt, that if any serious danger threatened either of the great English-speaking nations, they would be found side by side, as they were in the days when fighting the French and savage Indians, to which the article refers. The only thing which seems to call forth such sentiments as those shadowed forth in the article mentioned, is what Germans call *Brodneid*, and for which the writer, for the moment, cannot find an adequate expression in English. It might be described as jealousy of trade. That there is some cause for this, and that it is your (England's) own fault, would not be so difficult to prove either—and from the expressed views and opinions of men who are Englishmen, and who have said this for Englishmen's sake quite recently, and in England.

Some of the trouble may be because of a misunderstanding of the "Yankee speech" on the part of the Englishmen at home. Ask yourself: Is it not true that in dear old England itself there are localities in which the spoken English greatly differs from the written language, and by reason of which fact misunderstandings might arise in the minds of those who are not learned in the local idioms? Let us, therefore, rather be charitable to one another, and not take offence quickly, or anyway, where quite possibly none was intended. This brings me to the "engineer who is sufficiently at home in London to find his way about on foot." The description in one respect about fits the writer, who has wondered if he was not the one quoted; because he did say something which could have been misquoted to read just like that. But nothing is more certain than that he did not use the language quoted, and in the sense given.

To make my meaning clearer, permit me to illustrate. But first let me say that the writer made two trips to Europe to learn more about his profession, that of a gas engineer—which statement at least is not in the nature of claiming superiority, and hardly is boastful. And he did learn a great deal, in both directions—viz., how to do some things, and how not to do others. But the fact stands that he went to improve himself. Quite a number of his fellow-engineers from this side have done the same; and it is evident that they seem to have returned with the object apparently accomplished, for, pardon the digression, the inclined retort system seems at last to find appreciation, as well as a few other English and Continental specialities.

But to my illustration. The writer visited the great Beckton works, and, through the courtesy of several of the officers of the Company, was shown every attention. On leaving, however, his feelings were largely those of disappointment. While there was much to admire, there were not a few things which, the writer thought, could have been more or less improved. But please note this: If the engineers who are responsible for the Beckton works were to be given opportunity to raze them and rebuild anew, would they not themselves also be able to improve upon the present plan? Does anyone doubt this? The writer does not.

Having visited and inspected probably as many gas-works as any other living gas engineer, and having had quite a successful experience in conducting all kinds of gas plants (boasting again?), he knows that others who came after him could very likely improve upon his work. This is something any candid engineer may have observed in his own experience. Such thoughts do not necessarily denote that the thinker disparages his predecessors, or claims any sort of superiority. Certainly such were not the thoughts of the writer when he gave expression to them at a certain meeting.

On one occasion, the writer was favoured with seeing the recorded work of a number of gas engineers and managers who stand high in the annals of our profession, and who, without exception, are respected for their attainments by the writer himself, who yet thought, from what he then saw, that he could improve somewhat on the results shown, and why? Not for an instant did he suppose that he knew it all, or any more than the men whose work he saw. If the reader will only take his own experience to his aid, he will know that, as he may view a matter in a new light, he may be able to improve, if not nearly everything, still enough to make it (pardon the Americanism, but it expresses the idea very fully) "pay." It is for these reasons that it would be very much to the advantage of gas companies and corporations if they did a little more frequently call in for consultation the professional consulting engineer.

Now a few words about that "American paper which claims to present all that is best in the American gas world." Excuse me if I give another illustration to make my point clear. Some years ago, the writer was an applicant for a position. His character and ability were unquestioned. But, said one of the appointing powers, "He writes too much." And the end was that I did not get the appointment.

As the chronicles of the American and Western and some other Gas Associations show, and as the files of the past years of the American Gas Journals will also prove, the writer has written many an article, some of which were honoured by being reproduced in your valuable and ever-welcome "JOURNAL." He wrote for instruction, and sometimes to try and induce others to write. He has never received one penny for his work. But the greatest reward for all was (?), as just mentioned, when he really wanted a position, and was put back because "He writes too much." And the subscriber knows that this writing to journals is considered a serious drawback in any employee of American gas companies. The younger men have taken notice of it, and act and govern themselves accordingly. Hence the plaint of the American Editor who is mentioned in your article. As a Past-President of one of our Associations, I know how hard it is to get papers, and largely for the reason just stated.

You may, with justice, decry the actions of a class of people who, while themselves benefited by the labours of liberal-minded engineers, will attend Association meetings, will quietly sit around, and never open their mouths, excepting perhaps to ask leading questions for information, while never contributing, though perhaps quite competent so to do, even a little bit; and who then will "turn down" others who "keep the ball a-rolling" for their own and their fellows' use. But the rank and file of the profession who are obliged to work under such a system deserve, may be, your sympathy, not your censure.

With the exception of a comparatively few (shall we say fortunate?) men, men of mature years, no matter how competent in every respect, are not wanted by gas companies here. Such notable men as Sir George Livesey, Corbet Woodall, H. E. Jones, Charles Hunt, and others whom the writer has had the honour to meet and the pleasure to converse with, would not be possible in this country. They would have been turned out long ago as too old. It was not always so; it is a fad of the growth of the past seven or eight years only—a fad which had its run through every path of business or life; even the ministry was not exempt. The responsible (?) heads of gas companies will pay anywhere from $50,000 to $75,000 for mistakes made by young—and, of course, inexperienced—graduates from some near-by "Institute," rather than retain and pay a living salary to a man of tried knowledge in the profession.

This sort of thing bears fruit, of course. For instance, in a gas-works not thirty miles from where this letter is being written, a series of disastrous explosions may be traced to just such a course of action. Thousands of dollars were lost, and a number of lives sacrificed. The information, however, never got as far as the complaisant Technical Press; while the regular daily papers have too many other matters of importance to deal with. After bringing the item in their news columns, that's the end of it. One of these explosions occurred only two weeks ago. Did you see it mentioned anywhere?

The writer, who is in his 56th year, with a career of 31 years of exceptional opportunities to study and practice his profession; with a fair reputation, and not a blot on his character; physically as strong as most men at 35—yet has been unable to obtain a professional engagement for years, and now no longer expects one. The sole reason for this is that "he is too old," and did "write too much"—though, if you will look over what he did write, he will cheerfully leave the verdict to you whether it was not always acceptable in a professional sense, while never "telling tales out of school."

Last Tuesday, Sir John Aird, Bart., M.P., the Mayor of Paddington, was presented, by the members of the Paddington Borough Council, with an illuminated address expressive of their appreciation of his personal services and liberality in connection with the local Coronation festivities, the peace celebration, the welcome to Viscount Kitchener, and other notable events in which he took the leading part. The Mayor acknowledged the compliment paid him, and subsequently invited his colleagues to dine with him at the Great Central Hotel on the 8th prox.

TECHNICAL RECORD.

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Twenty-Fifth Anniversary, and Honour to Mr. Charles Hunt.

By long-established custom, Thursday is the day on which the members of the Midland Association, as a rule, hold their meetings; but, by a happy thought on someone's part, it was determined to alter the day of the autumn meeting this year to last Saturday so that the members might unite in celebrating, on its actual date, the twenty-fifth anniversary of the first general meeting of the Association, and at the same time do honour to their President (Mr. Charles Hunt), who was one of the founders—although, as he acknowledges, not the actual originator of the Association—and the first President. We need not in this introductory paragraph give any account of the history of the organization, as Mr. Charles Meiklejohn (the late Hon. Secretary, and now the President-Elect) told the story of its early years in presenting to Mr. Hunt, during the evening, in the name of the members, a gift, the richness of which typified the character and quality of the esteem in which that gentleman is held by his colleagues in the Midlands.

The Meeting was held at the Grand Hotel, Birmingham; and the PRESIDENT (Mr. Charles Hunt) took the chair soon after two o'clock, and it was seen that many members who are not able to regularly attend the meetings had made a special and successful effort to be present, in response to the Hon. Secretary's reminder as to the occasion being one of exceptional interest. Among the visitors were Mr. Arthur Graham, of Mansfield (the President of the Manchester District Institution of Gas Engineers), and Mr J. G. Tooms, of Waterford (the President of the Irish Association of Gas Managers).

The HON. SECRETARY (Mr. A. Cooke, of Oldbury) commenced the proceedings by reading the minutes of the summer meeting at Malvern; and they were confirmed.

NEW MEMBER.

The only application for membership was from Mr. Joseph W. Eagles, of Whitwick, Leicester; and he was unanimously elected.

APPOINTMENT OF OFFICERS.

The PRESIDENT said he had much pleasure in proposing for the acceptance of the members the name of their esteemed Vice-President (Mr. Charles Meiklejohn, of Rugby) as President of the Association for next year. He was sure he would receive the unanimous support of the members, having regard not only to his own estimable character, but to the excellent work he had done for the Association as its Hon. Secretary for so many years. The Association owed a great debt of gratitude to Mr. Meiklejohn; its present position being largely due to his exertions.

Mr. R. O. PATERSON (Cheltenham) seconded the motion, remarking that nothing would be more agreeable to the members than to see their late Hon. Secretary in the chair.

The motion was heartily agreed to.

Mr. MEIKLEJOHN said he thanked the members very much for the kind and unanimous way in which they had elected him to the office of President of the Association. There was a scriptural injunction with reference to him who putteth on his armour. He must confess he had very little boasting humour that afternoon; but he could assure the members that it would require all the kindness and indulgence which they had extended to him during the past seventeen years he had been a member of the Association for him to struggle into the armour at all. He hoped, however, he might be able to acquire some of the reflected glory of his predecessor, because modern science had proved to demonstration the powerful influence of the X rays. (Laughter.) So far as in him lay, he would do his best on behalf of the honour and credit of the Association as it had been carried on by so many worthy predecessors.

Mr. T. BERRIDGE (Leamington) proposed that Mr. George Helps, of Nuneaton, be elected the Vice-President of the Association. He had frequently contributed to their proceedings and also to the technical journals; and he (the proposer) believed he would make an excellent Vice-President.

Mr. T. GLOVER (Norwich) seconded the motion; and it was unanimously adopted.

Mr. HELPS said he appreciated extremely the honour the members had done him in electing him to the Vice-Presidency. He hoped he should succeed in reaching at least a minimum of efficiency in the position.

Mr. PATERSON proposed that the members should continue in office their worthy Hon. Treasurer (Mr. W. R. Cooper).

Mr. J. FERGUSON BELL (Derby) seconded the motion; and it was cordially passed.

Mr. COOPER thanked the members for their continued confidence

in him. He was, he maintained, the best Treasurer they had ever had (laughter), for he had the largest amount of funds in hand they had ever seen in connection with the Association.

The PRESIDENT proposed that Mr. Cooke be re-elected Hon. Secretary for the ensuing year. They could not, he said, do better, having regard to the services of Mr. Cooke during the past year, than re-appoint him to the position.

Mr. J. C. BELTON (Chester) seconded the proposition; and it was cordially agreed to.

The HON. SECRETARY acknowledged the continued confidence of the members.

On the motion of Mr. MEIKLEJOHN, seconded by Mr. P. G. WINSTANLEY (Wolverhampton), Mr. W. Langford, of Longton, and Mr. Hubert Pooley, of Stafford, were elected members of the Committee.

Mr. B. W. SMITH (Walsall) proposed and Mr. HENRY FOWLER (Derby) seconded. the appointment of Mr. F. W. Stevenson, of Coventry, and Mr. H. E. Copp, of West Bromwich, as Auditors.

The motion was unanimously carried; and a brief acknowledgment by Mr. LANGFORD and Mr. COPP ended the formal business.

PAPERS READ.

The members then settled down to the consideration of the technical items on the *agenda*. The papers were read in the following order:—

"Gas and Electricity Departments in Combination." By Mr. S. MEUNIER, of Stockport (*see* p. 1016).

"Some of the Questions Involved in the Slot-Meter System Considered" By Mr. G. HELPS, of Nuneaton (*see* p. 1020).

"Recent Improvements at the Chester Gas-Works." By Mr. J. C. BELTON, of Chester (*see* p. 1011).

A few remarks on the latter paper concluded the technical part of the meeting.

DINNER AND PRESENTATION TO MR. CHARLES HUNT.

In the evening, there was a departure from the customary method of ending the proceedings at the meetings of the Association. Instead of the usual high-tea, the fortuitous but happy combination of events was celebrated by a dinner, and by a presentation to the President—the day marking his 25 years' service to the Association and the close of his official connection with Birmingham, although, as a matter of fact, his holidays caused the actual termination a few weeks since. The President of the Manchester Institution (Mr. Arthur Graham) and the President of the Irish Association (Mr. J. G. Tooms) were among the guests.

After dinner, the loyal toast having been honoured,

Mr. CHARLES MEIKLEJOHN (the President-Elect) said the toast he had the honour to propose next was one that he was sure would meet with a very cordial reception on the part of the members—that was, the health and happiness of Mr. Charles Hunt, their President. (Applause.) He thought the members, as well as their President, could be heartily congratulated on the fact that, Mr. Hunt, having been President in 1877, had been spared to them to occupy the chair on the twenty-fifth anniversary of the Association. Perhaps he might be pardoned if he here referred to the beginnings of the Association, for some of the members might not have the facts in mind. The preliminary meeting was held at the Windsor Street Gas-Works on Sept. 20, 1877. There were then present: Mr. Charles Hunt, in the chair; Mr. J. Annan, of Wolverhampton; Mr. William North, of Stourbridge; Mr. J Tindall, of Walsall; and Mr. T. Collett, of Dudley. From that conference issued a circular, calling the first meeting of the Association; and it was held on Oct. 11, 1877, in the Midland Hotel, which occupied the ground on which the Grand Hotel (in which they were then assembled) now stood. He might say that at the first general meeting there were fifteen gentlemen present. Among them were Mr. Charles Hunt, Mr. R. O. Paterson, Mr. J. Annan, Mr. W. Winstanley, Mr. J. S. Cranmer, Mr. John Tindall, and Mr. Thomas Layton. These gentlemen he was happy to say were still living, and in active and good health. But the remaining eight who were at the first meeting had since died. Then there was another remarkable fact, that among the names he had read there were only two gentlemen who had retired from active work; the whole of the others being in the same responsible positions that they held 25 years ago, which gave a wonderful average service for 25 years. As he had already said, Mr. Hunt was elected President at the first meeting; and the following officers and members of Committee were appointed: The late Mr. Peter Simpson, of Rugby, was the Treasurer, and Mr. John Tindall was the Hon. Secretary, while the members of the Committee were: Mr. R. O. Paterson, of Cheltenham; Mr. J. Annan, of Wolverhampton; Mr. J. Deakes, of Worcester; Mr. T. Collett, of Dudley; Mr. S. B. Darwin, of Shrewsbury; and Mr. W. North, of Stourbridge. In looking up some of the old records of the Association, he (Mr. Meiklejohn) was anxious to see the part Mr. Hunt had taken and performed in connection with the work of the Association during the last 25 years. In beginning to take note of these events, he soon discovered that, if he were to record all that Mr. Hunt had done, he would have to give the whole history in detail of the Association's work. Mr. Hunt occupied the chair not only the first year of its existence, but also the second year—that was in 1877-8 and in 1878-9. In 1879, the members visited the Windsor Street works to inspect the extensions then in progress. Then in April, 1880, Mr. Hunt read a paper on "The Results of Experiments with Lanterns and Large Burners," illustrated by diagrams. In June of the same year, Mr. Hunt wrote to his (Mr. Meiklejohn's) predecessor, at Rugby, who was then the President of the Association, suggesting—and the suggestion was realized very successfully—the formation of what was now known as the "Birmingham Medal." Mr. Hunt then occupied the chair of the British Association of Gas Managers. The amount collected in connection with the medal was £383; and the whole was handed over to the British Association. The medal was bestowed for original research in connection with the gas industry, and was endowed for the purpose. Mr. Hunt was himself the happy recipient of it in 1886. In 1882, their President opened a discussion on the promotion of the day consumption of gas, and in September of the same year he read a paper on "Generator Firing and Regeneration or Recuperation." In 1883, the Association again visited Windsor Street; and in 1884, after the annual meeting, the members attended the meeting of the Birmingham and Midland Section of the Society of Chemical Industry, to hear a paper by Mr. Hunt on "Gaseous Fuel Applied to the Heating of Gas-Retorts." A meeting was again held at the Windsor Street Gas-Works in May, 1884. In February, 1886, the meeting was also held there, when the members had the opportunity of viewing the noble twin gasholders erected by Mr. Hunt that year. In 1887, the President again contributed a paper. This time on "Differential Prices for Day and Night Consumption;" and this completed the first ten years' record. He (Mr. Meiklejohn) stopped taking notes then; for he found he should have to refer to nearly every meeting of the Association to record all that Mr. Hunt had done for it. But there was another noteworthy circumstance about the ten years; and it was that during the whole of the decade, Mr. Hunt was not absent from a single meeting. He (Mr. Meiklejohn) did not hesitate to express his own conviction that the success of the Association, and its stability, had been secured by the constant and unremitting attention—not only of Mr. Hunt, but of those gentlemen still living who were associated with him in its formation. Regarding the work of the Association during the remainder of the period, it came well within his own personal knowledge, and of a good many of the members present; and therefore he need not specially deal with it. However, he thought they would all agree with him that the visits to the Windsor Street works had been, and were, in themselves a matter of education to any manager whose privilege it was to go there. Not only had Mr. Hunt done good work by his presidential addresses and papers in the years past, but he had always been glad to offer the members an opportunity of seeing his work in progress as well as on its completion. Time would fail him to tell all that Mr. Hunt had done in connection with the Association. But as one who had filled the Hon. Secretaryship for a number of years, he (Mr. Meiklejohn) had always recognized that, in him, they had one who was a stay and a buckler to any poor Secretary in times of trouble. As to Mr. Hunt's professional career, he should have been glad if this toast had been placed with one more competent to speak than himself. The thirty years' service their President had rendered in Birmingham was surely unique in the records of long and faithful work. In 1872, when Mr. Hunt came to Birmingham, the daily maximum output from the Birmingham Gas Company's works, to which he was appointed, was about 3,600,000 cubic feet; and in 1902, when he completed his thirty years' service, the maximum daily make amounted to 12,203,000 cubic feet. As an adjunct to the manufacturing concern over which he had so ably presided, there was now a carburetted water-gas plant capable of a daily production of 4 millions greater than the total maximum of the works when he took charge in 1872. Not only that, but the gasholder capacity in 1872—the whole of the holders, eleven in number—was only 3½ million cubic feet; while in 1902 the total capacity amounted to 17 millions. Now this to those present who were conversant with gas-works, meant much more than the difference in the proportionate figures represented. They could fully realize what a strain and anxiety it must have been to carry out the considerable extensions necessary to the production of this much larger volume of gas, and the engineering ability that must have been expended by Mr. Hunt on the adequate provision for its storage. There might be in some minds a question in regard to the success or otherwise of municipal trading. Now Mr. Hunt had always appeared to him as a strenuous advocate, and example in defence, of municipal management. But that was quite a different thing. The question as to the disposal of municipal profits was one on which there were conflicting opinions; but there could only be one opinion about the ability and worth of the men who produced those profits, although it was to be feared that their ability and worth were not always fully acknowledged and rewarded. They might, however, congratulate Mr. Hunt on the important recognition of his work and ability manifested by Sir George Livesey and his colleagues on the Board of the Crystal Palace District Gas Company, who, as soon as Mr. Hunt was free from his official work, asked him to take a place on the directorate of the Company. With regard to Mr. Hunt's future work, it was well-known to the members that he was now to take an important place as a Consulting Engineer. As one who had had such a long experience and training in and

with municipal undertakings, he could imagine no one better qualified to advise municipal bodies in the direction of their affairs. Should it ever be his fortune (or misfortune) to see Mr. Hunt at Rugby, either with the object of appreciating his Company's little works if they were selling them, or depreciating them for "the enemy," he could assure him that, if he came on behalf of his Company, he should recognize him as a good friend, and, if he came on behalf of "the enemy," he should recognize in him a fair opponent. (Applause.) But he hoped he should not see him at all. (Laughter.) There was another matter they ought to congratulate Mr. Hunt upon. He (Mr. Meiklejohn) had had experience in municipal work himself; and he had come in contact with committees of local authorities, and so had some knowledge of their work. A member of a committee met him one day in Birmingham in reference to the appointment of an officer—not a gas engineer—for a town not 100 miles from Birmingham. The gentleman applying for the position was a comparatively young man, and he was a man who had had a great deal of experience, and long periods of service with large public bodies. But he did not get the appointment; the reason being—so his (Mr. Meiklejohn's) friend said—that when they came to look into the number of years he had spent in the various works he had mentioned, and the grand undertakings he had controlled, he must have been about 100 years old. Now Mr. Hunt could not escape from their arriving at a very fair opinion as to his age on this occasion, because, in the published record of his work in Birmingham, they found he was six years Assistant Engineer to one of the London Gas Companies before he was appointed to Birmingham. He came to the city in 1872; and he had been there thirty years. He was 24 years of age when he was appointed to the London assistant engineership; and therefore Mr. Hunt celebrated that day his sixtieth birthday. He (Mr. Meiklejohn) was sure the members would all join with him in the heartiest possible manner in wishing Mr. Hunt "very many happy returns of the day." He had only just a word to say by way of apology to Mr. Hunt, and at the same time of defence of himself. When Mr. Hunt consented to occupy the position of Vice-President with the view of filling the chair on this the twenty-fifth anniversary of the Association's work, and at the conclusion of his labours in Birmingham, he to some extent made him (Mr. Meiklejohn) give him a pledge that no fuss would be made about himself. But the unanimity and heartiness with which the members had responded to the suggestion that some prominent mark should be made of Mr. Hunt's retirement must be the justification and the proof that he (the speaker) was wisely advised in not paying attention to their President. A sentence or two in the circular that was issued to the members by the Committee expressed the position as well as, and better than, any of his own could do. "The Committee of the Association," the circular said, "feel sure that the members would be glad of the opportunity to express in some tangible form the unique services rendered by Mr. Hunt, not only to the gas industry in general, but to the Midland Association of Gas Managers in particular." And not only had they to thank Mr. Hunt for his constant work in connection with the Midland Association, but many members—himself among the number—had often been under, and were still under, an obligation to him for much personal kindness. He had always been easy of approach; he had always been courteous in manner; and he had always been willing to help members of the Association whenever they required his assistance. Of this he (the President-Elect) was quite sure, that, whatever might be the feeling—and he believed there was a deep feeling against the employment of consulting engineers in general—there could be no question, in his mind, that Mr. Hunt, as a Consulting Engineer, would be one with whom consultation would be of the greatest possible benefit and use, and then, when he had performed his consulting work, a manager would not need to fear that he would be turned into a respectable foreman. He believed that the feeling was not justified; but he was convinced that there were a number of managers of small works who dreaded calling in a consulting engineer lest thereafter they would lose control of their works. Mr. Hunt was a man of somewhat different calibre to that. (Hear, hear.) Concluding his remarks, Mr. Meiklejohn said: I can only now, on behalf of the members of the Association, ask you, Mr. Hunt, to accept the present that they have determined to give you; and I am quite sure, as your services have been long, so the members of the Association desire that your years may be long, and that your happiness may remain unclouded, after you have left this neighbourhood of ours. While you will be severed from us in the flesh, I hope, and I am sure, the interests of the Association, of those who have the control of it, and of those who are members of it, will always have a warm place in your heart. (Applause.) This silver tea-tray has an inscription on it, which I had better read. It says—

Presented to
MR. CHARLES HUNT
By the Members of the
MIDLAND ASSOCIATION OF GAS MANAGERS
On the Occasion of the Twenty-Fifth Anniversary of the Association, as a Token of Esteem and Regard.
11th of October, 1902.

I am sure, Mr. Hunt, this silver tea-tray, kettle, and stand inadequately express the feeling of deep regard which the members have for you; but it expresses better than my words can convey my own deep feelings of gratitude for your great kindness to me personally.

Amid applause, Mr. Meiklejohn handed the beautiful gifts to the President.

The toast was enthusiastically honoured, and cheers were given for Mr. Hunt, Mrs. Hunt, and the family. After the applause had subsided,

Mr. HUNT (who was deeply moved by the words that had been addressed to him, and by the demonstration of affection on the part of the members) said—Mr. President-Elect, Vice-Chairman, and gentlemen: There are occasions when the heart is too full for utterance; and I feel simply overwhelmed by the great kindness which has been shown me on all sides. Only a few weeks ago, I was most gratified by a presentation to me, which was totally unexpected. It came from the workmen and staff at the Windsor Street and Adderley Street works. Last night I was the recipient of another token of regard from many of my late colleagues [see p. 1004], and now to-night you, my professional brethren have, in words, with the eloquence of which I cannot attempt to vie, expressed, more adequately than I deserve, your esteem for one who has tried to do what he felt was before him to do, without any other idea than to serve as best he could the interests of the gas industry at large. You, Sir, have spoken in terms which I do not fully deserve—["Yes, yes"]—of the work which I have been permitted to do for the Midland Association. It is true I was one of its promoters; but I was not its originator. The credit of the origin of the Association belongs to one who, I am sorry, is not present with us to-day—that is, our old friend Mr. John Tindall. At the Bristol meeting of the British Association of Gas Managers, he spoke to me on the subject, and said there was a general desire to have an Association in the district; and he expressed the hope that I would see my way to take the matter up. I did so, and the response was very satisfactory. I am more than satisfied to-day to know what good work has been done throughout the 25 years' life of the Association. What I have personally done is no more than you all have done, as far as circumstances would permit. Everything I have done has been due to the circumstances which surrounded me; and if it has been more than others have been able to do, it is simply because my opportunities were greater. I cannot express what I feel with regard to the kind way in which my professional career has been referred to; nor can I put into words what I feel as the recipient of this handsome gift, which I shall treasure as one of my most valued possessions, and which I am sure my family will always look upon with the greatest pride. The happiness of the choice is also very touching to me, because it is not only something that I can myself enjoy, but something which my family can also enjoy. I thank you, Mr. Meiklejohn and gentlemen, very heartily indeed for your great kindness to me. I can assure you it is not my intention to sever my connection with the Association. (Applause.) It is very possible I may not be able to attend the meetings so regularly as I have done; but, so often as I can, you may rely upon it I will attend and take part in your proceedings. I hope for many years to come we may, and we certainly shall, remain fast friends. From the very bottom of my heart, I thank you for your great kindness.

Among the subsequent toasts was "Kindred Associations," proposed in felicitous terms by Mr. Berridge, and responded to by the Presidents of the Manchester Institution and Irish Association (Mr. Graham and Mr. Tooms). The former gentleman referred to the circulars that had been sent out regarding the amalgamation of the Gas Institute and the Institution, and said he was very anxious to learn what would be the result of the voting three weeks hence.

Music and songs were interspersed in the proceedings; and the members spent a most delightful evening to a day which will be historic in the annals of the Association.

PACIFIC COAST GAS ASSOCIATION.

Annual Meeting in San Francisco.

(*Concluded from p.* 879.)

MUNICIPAL OWNERSHIP.

Mr. Frank J. Symmes, of San Francisco, submitted a lengthy paper dealing with municipal ownership. He said that water, light, and transportation were essentials that should be obtainable at the lowest price, and with no question as to quality. Other public utilities were of less importance, but equally effective for political purposes. The first thing in the development of a township was the water supply, then gas, car tracks, electricity and light, telephones, steam, &c. The man or company who placed these utilities within reach of the citizens was at first regarded as a benefactor; but later the citizens claimed rights of control and even ownership. Private enterprise came first, and was encouraged by franchises offering certain advantages; and as soon as the utility was firmly established as a thing of permanent value, the claims on behalf of municipal ownership began. In time, and after costly experience, it was discovered that municipal administration was not suited to this kind of responsibility.

After certain waste, extravagance, and political corruption, the utility was run down and neglected; and the last step was a return to private management, with business methods and honest administration. The capitalist knew from experience that the public utility was a good investment, and that he could conduct the business affairs of the great water, gas, or railroad company far more economically than the public officials, and that the difference was a handsome profit. But the public utility was equally attractive to the politician and the office holder. It offered places to be filled, money to be handled, good opportunities for honourable distinction, and still greater and finer ones for plunder. And to the demagogue, the public utility came as a glorious blessing. He held it up as the greatest public enemy, the most wicked of trusts. It was a red rag to the Socialistic bull, to incite the ire of the crazy anarchist, and whip their votes into line; but to the plain, honest citizen, it was a complicated piece of machinery necessary for the use of the public. Whether done by the wicked company or the extravagant municipality, he was too often an unnecessary sufferer; but not always so great a sufferer as was represented. He should not accept all that he was told, but should see for himself fairly, judge calmly, discern truth, and demand justice. He would find two radical and extreme views on the subject, with a growing tendency towards municipal ownership. There were strong arguments against State interference with any private enterprise, and other reasons in favour of the government performing all public utilities, and as usual, reason and good judgment would be found in the broad, middle path. The question was a business one, not complicated by religious or philanthropical considerations, but entangled by political ones; and from these he must seek to free it. Under any system, it must be honestly and efficiently conducted; and in this the true value lay, rather than in any system of ownership. The real question was, "Can the public utility be furnished better by a private company than by the city government," and not, "Who owned the property?" It was one of results, not of methods. It did not follow that what had been done in one city with success could be done in another under altogether different climate and circumstances. Individual examples were of little value unless all the conditions were the same. A very full report—extending to 975 pages, and dealing with 2353 undertakings—had been issued by the State Commissioner of Labour. It covered nearly one-third of the total number of gas, water, and electric investments in the United States; and 42 per cent. of the total number reviewed were under municipal ownership. But a full investigation failed to satisfy any positive claim on behalf of either side, and went to show that it was not so much a question of ownership as of managership. Public ownership met the severest test in large cities, and its greatest successes were always found in the smaller places. Good public managership was best acquired when the city was young; and in smaller districts the officials were ever under the public eye. In nearly every case of so-called successful municipal ownership, only a part of the story was published, only a part of the actual expense admitted, or the book-keeping juggled, and many examples could be quoted in proof. The instances of economical or efficient management of common business transactions by City, State, or National Governments were rare; and evidence of fraud in connection with contracts was a common experience. Estimates could be made to prove anything, and the investigator must not be misled by the allurements of first figures. Few men could ever build a house and in the end come out even with the first estimate. This point was illustrated by some remarkable examples. In Europe, public ownership usually proved a success; but the conditions were vastly different from those in America. No State in America stood less in need of public ownership than California, where there was already the best kind of control. The public officers had the power to fix the price of gas and water, and that was far better than ownership. California already had the chief advantage of municipal ownership without the risk. He did not know about other cities, but San Francisco was not badly treated by the public companies; and there were many things more urgent to the public welfare than ownership of the gas or water supply. A full and fair investigation would show that gas, water, telephone, telegraph, and railway companies could be conducted more economically under private than under public ownership. The whole thing resolved itself into a question of the skill and character of the management.

Gas Purification.

Mr. E. C. Jones, of San Francisco, read a paper on "An Experiment on the Principles of Gas Purification." He reviewed the generally accepted theory that the greater the extent of surface the more effectual is the purification, and observed that area had usually been considered without regard to thickness of material traversed by the gas. In accordance with this, the purifying houses of to-day covered large areas with comparatively shallow boxes; but in the course of practice it was recognized that these, instead of containing several thin layers, should have two thick layers, and finally one layer only, the depth or thicknesss of which was governed only by the height of the box. Recent developments tended to the saving of ground room by the adoption of tower purifiers, which might be described as square or cylindrical sheet-steel tanks of considerable height, containing a large quantity of oxide on a comparatively small floor area, and hermetically sealed without the use of the water lute. This would require convenient arrangements for revivification *in situ*. It would seem from the latest experiments that the accepted form of purifier was the least adopted in shape for efficient purification. To test the matter by experiment, he made two small boxes, each capable of containing 2 lbs. of oxide of iron. They were cylindrical in shape, one having a cross section of 100 square inches and containing one tray or layer of oxide $1\frac{5}{16}$ inches in thickness. The other had an area of 10 square inches, and contained ten trays or layers of $1\frac{5}{16}$ inches thick. Crude gas from a 7000 cubic feet store holder, containing 180 grains of sulphuretted hydrogen per 100 cubic feet, as determined by Tutwiller's apparatus, was passed through each of these at a uniform rate of 1 cubic foot per hour. The flat box only reduced the impurity to 30 grains per 100 cubic feet; but in the narrow tall box the gas was completely purified. In each case the same amount of gas passed through the same amount of oxide in the same time; yet in one it was imperfectly, and in the other thoroughly, purified. These experiments led to the conclusion that oxide might be used to better advantage in boxes of less costly construction and occupying less floor area. The flat purifier represented the form of apparatus generally used, and the tall purifier the form of apparatus that might with advantage be substituted for it.

Mr. Lowe opened the discussion by remarking that the experiment indicated that the accepted principles on which purifying boxes were constructed were not correct. Mr. Eichbaum said that nobody thought of using one thin layer of oxide only, and that the ten layers really represented the three or four purifiers as generally used. The experiment seemed to show the importance of employing a good number of layers, which might be in one or more boxes without affecting the result. No doubt the one tall purifier was an advantage; but in practice it would be difficult to handle the material. Some 25 years ago, he devised a revolving purifier in which the oxide was caused to travel through the apparatus; but he had never carried the idea into practice. As to revivifying *in situ*, a time would come when the accumulation of sulphur would necessitate discharging and refilling, and suitable arrangements for the purpose could not be dispensed with. Mr. Foveaux remarked that in 1898 he had proposed to use a purifying box 15 feet deep, with four layers of oxide. Mr. L. P. Lowe said there could be no question but that the cylindrical tower was the cheaper and more efficient form of purifier. Practical conditions would determine its height; and he thought that 25 or 30 feet was as high as any constructing engineer would care to go. Mr. Hollidge had tried revivification *in situ* by drawing air through with a steam-injector; but trouble from naphthalene necessitated the discontinuance of the process. The steam did not come in contact with the gas.

Mr. Jones, in replying, said that his model tower purifier might be taken to represent a vessel 20 or 30 feet high; and it showed that, when he was going to build a purifier-house, he need not cover 3 or 4 acres of land with costly boxes fitted with complicated connections. A tower of the kind could be supplied with manholes and conveying devices for dealing with the oxide. This need not be often done, as he had proved in practice that oxide could be used *in situ* for two years or more before the accumulation of sulphur necessitated its removal. He used steam at the outlet as an ejector to draw air through the vessel, and did not see how that could possibly affect the question of naphthalene.

Low Consumption and Meter-Rents.

Mr. R. P. Valentine, Sacramento (Cal.), the Editor of the "Experience Department," presented his report. Among the items was a digest of the case of Smith *versus* Capital Gas Company, which is of general interest as affecting the right of gas companies to make a minimum charge in cases where the gas is not used regularly but merely retained as a stand-by. The plaintiff only used about 8s. worth of gas per annum; and the Gas Company called upon him to pay 2s. per month as meter-rent. He refused to do so, on the ground that the other customers did not pay such a charge. The Company cut off the supply, and were sued for heavy damages. The Lower Court found that the rent charge was fair and equitable, but that there was no bye-law of the Company requiring it. The Sacramento Gas Company had remedied this by passing a regulation that their minimum charge should be 2s. per month.

In discussing the decision, Mr. Lowe thought there could be no question about the fairness of such a law, but that some judgment should be exercised in applying it. Some consumers were away, or for other reasons used no gas for two or three months in the year, but were large users during the remainder. Under such circumstances, it might not be wise to press the minimum charge. Mr. Keyes said that his rule was a minimum charge of 4s. per month, which was applied without exception. It was notified as a condition of supply, and no dissatisfaction was created. Mr. Aldrich said that he was prohibited from charging meter-rents, and therefore his Company had adopted the minimum charge of 2s. per month. Mr. Britton said that the minimum charge was always usual in connection with the supply of electricity, and was therefore quite fair as applied to gas. Mr. Martin said that, where the same concern supplied both electricity and gas, and the electric service was not quite perfect, it was difficult to prevent people from keeping the gas-meter as a standby. Mr. Osborn objected to the charge being made as meter-rent, and advocated charging 200 cubic feet or so of gas in

advance. This met the case of large consumers who temporarily discontinued gas.

DIFFERENTIAL GAS-RATES.

This was the subject of a paper by Mr. M. C. Osborn. The need for these was not evident until they were forced by the competition of cheap petroleum, high-power lamps, and the early closing movement. Many in the district had endeavoured to meet such competition by contract or flat terms, often under ruinous conditions. When arc and incandescent lighting entered the field, many of them took up the supply of electricity. As producers of both, it was necessary to consider causes other than the mere cost of production. The gas man of fifty years ago sold the bulk of his production in a few hours out of the twenty-four; but now he had a day consumption that enabled him to do three or four times as much business with the same distributing and storage plant. There was a large branch of business that could not be secured except by a special price, and this was the case with fuel gas. He believed in a uniform rate for light; but the man who adhered to all-round uniform rates would get lost in the procession. The most striking illustration of the fairness of differential rates was afforded by calculating the cost of dealing with the present output under the circumstances that prevailed fifty years ago.

Discussion being invited, Mr. Aldrich thought it should not go forth that a living business could not be done on uniform rates, and went on to argue that with one price—and that a moderate one—it was possible to secure a large sale of gas. With the advent of the incandescent light, it was no longer necessary to make a high quality gas. With a well managed and not over-capitalized works, it was easy to sell at a price that would compete with electricity or anything else. He believed in differential rates to some extent, according to the quantity of gas used, but not in one price for light and another for fuel. The troubles of duplicate meters and supply pipes could be avoided, and the same results secured, by a system of discounts. Mr. Martin said they all had one end in view, and that was increased consumption and increased profit. To his mind, the question was affected by the nature of the demand. As regards light, that was limited; but as regards fuel, unlimited. Mr. Britton said that so far the question had been regarded from the view of the manufacturer only; but they should also look at it from the consumer's standpoint. The consumer did not trouble much about the rate per 1000 cubic feet, but looked at the actual sum paid; and he usually wanted to know how much of this was for lighting and how much for fuel. In his experience, there was much more complaint and dissatisfaction with the single than with the duplicate meters. After twelve years' experience with differential rates and duplicate meters, he contended that the results justified the means. He found no difficulty in inducing architects and builders to provide two lines of pipes—one for light and the other for fuel. The consumption of fuel gas had been put at 8s. per month; but with the water heaters and other appliances available, it averaged nearer 20s. per consumer. This could only be secured by the differential rate. Under the uniform rate, it would not be nearly so much. The gas men of the Pacific Coast made a mistake in not appealing to their customers on the line of a special rate for fuel gas. Mr. Lowe thought Mr. Britton argued well on behalf of duplicate meters, and no one would gainsay the convenience of the arrangement; but he did not touch the question of differential rates. He went on to show that the best interests of the consumer are met by selling gas at one uniform rate. He thought those who favoured two rates would not consider it logical if they were charged for coal or oil according to whether it was used under the boiler or in the retort-house. Mr. Holberton thought it was a question of keeping the plant going, and, therefore, more a matter of day and night gas than of fuel and light. A man who lighted up his basement all day was as profitable as one who used stoves. Mr. Osborn, in reply, said that one reason why he objected to uniform rates was because they unduly favoured the small consumer, who was, as often as not, a source of loss. They would not pay their bare expenses on customers who used not more than 1000 cubic feet per month. As a matter of fact, the large customer had to make up for him. He believed in the fairness of differential rates, even in the absence of competition, because the user of fuel gas required less outlay for storing, distributing, and establishment expenses than the user of illuminating gas.

ELECTRICALLY OPERATED APPLIANCES IN GAS WORKS.

Mr. Geo. C. Holberton read a paper on the above subject. He advocated the use of small electric motors for various purposes, such as operating valves, working the blowers for generators, drilling machinery, &c. Diagrams of the apparatus described were exhibited. The advantages of being able to actuate a steam-valve by means of electricity in case of a fracture of a steam-pipe was pointed out; also other advantages peculiar to the system.

The Burfield Masonic Election.—It will be a pleasure to those who have so kindly been instrumental in helping the case forward, to learn that at last Friday's election Wilfred Algernon, the son of the late Mr. F. G. Burfield, the former Secretary of the Gas Institute, was twenty-fifth on a list of thirty elected candidates. The number of votes polled in his favour was 4429; while those recorded for the lowest name on the list numbered 4024, and for the highest 6054.

RECENT IMPROVEMENTS AT THE CHESTER GAS-WORKS.

By JOHN C. BELTON, of Chester.

[A Paper read before the Midland Association of Gas Managers, Oct. 11, 1902.]

In bringing before you a few notes on what has been done to modernize the retort-house at the Chester Gas-Works, I must ask your patient forbearance while I relate a very plain tale, containing nothing in the way of startling novelty, but perhaps a few facts which may be of use to others who have a similar task before them to that with which I was confronted upon taking over the management of these works in November, 1898.

Mr. Fletcher W. Stevenson, who was the Engineer of the Company in 1880, built the then new works, which were completed in 1882; and for many years they rendered efficient duty, as well as presenting a model of convenient arrangement and handsome as well as substantial construction. At that time, what was known as the gaseous system of firing was very much discussed. The air was full of "generators" and "regenerators;" but the system was not sufficiently developed to justify its introduction at Chester. The new retort-house was accordingly designed for sixteen through arches of sevens on the established direct-fired principle, and was one of the best examples of its type and period. A few details of its construction will enable you to understand some of the difficulties met with when it became necessary to effect the change to modern methods of carbonization.

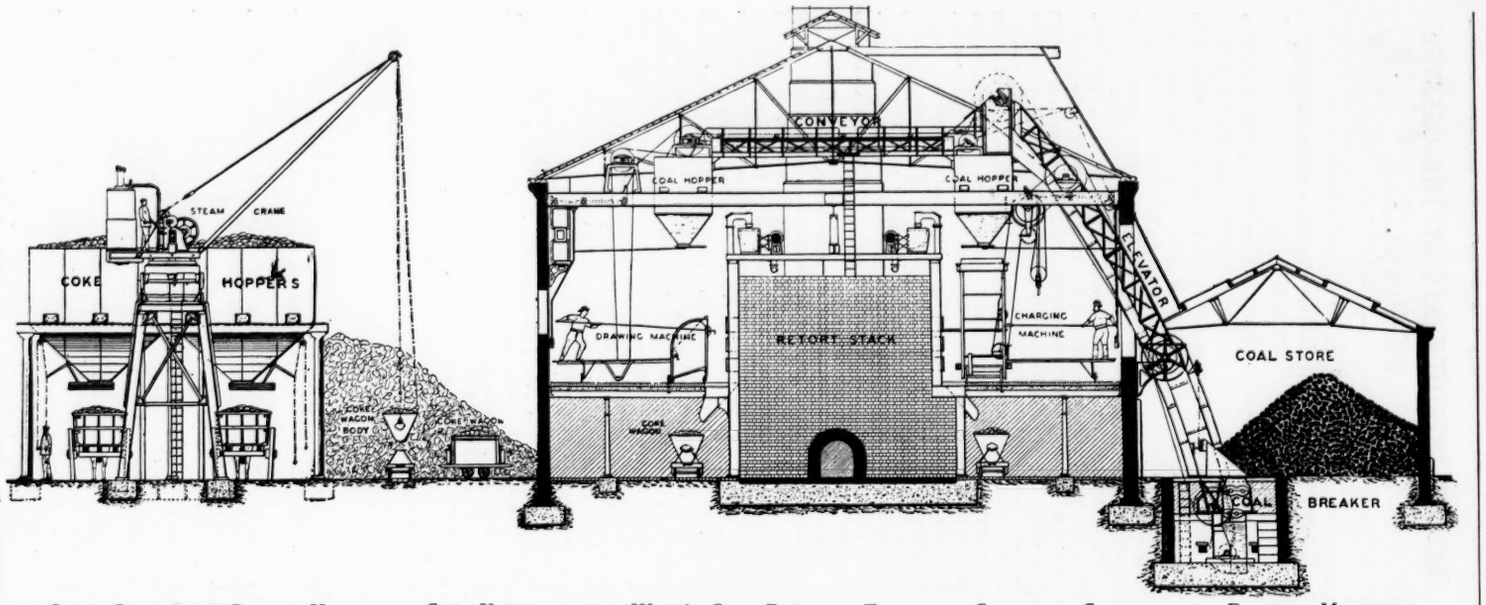
The chimney is in the centre of the building, which is 185 feet long and 60 feet wide, interior measurements. On either side of the chimney was a bench of eight through arches, in each of which were originally two beds of seven oval retorts, 9 feet long, set back to back. The retort lids were all of the self-sealing type. The ascension-pipes were 6 inches, tapered to 5 inches at the bridge. Separate hydraulic mains were fitted to each bed. These were connected by weir-valves to a 12-inch foul main feeding at either end of the bench into a rectangular condensing main 24-in. by 18-in. carried on brackets round the inside of the house wall and communicating by two 16-inch vertical mains with the inlet main of the annular condensers outside. Some seven of these double settings had been altered, prior to 1898, to various experimental types of shallow generators or regenerators, six retorts in a bed; and a subway, 6 feet deep and 3 feet wide, was constructed on either side of one-half of the house. These settings somewhat improved the make per mouthpiece; but they did not produce such results as to justify their extended use. Moreover, the labour of clinkering in the narrow subways was too arduous and dangerous for the men to take kindly to it. No doubt the late Mr. Hunter contemplated more drastic alterations, and would have brought the plant up-to-date had he been spared to carry out his intentions.

The carbonizing results obtained with the old settings were excellent for that type of plant. But the rapid development of new and better methods of carbonization within the last few years, resulting in large economies of fuel and labour impossible under the old system, rendered the arrangements in use at Chester obsolete and inefficient; while the development of the area of supply, and the rapid and prospective increase of consumption, pointed to a revision of the carbonizing plant as a matter of urgent necessity.

The conversion of an old retort-house is a very different undertaking from the erection and equipment of a new one; and various existing conditions contributed to limit the adoption of new methods. The height of the house was 23 feet to the wall plate. The walls are only 1½ bricks thick from the foundation upwards. It was therefore undesirable to increase their height beyond the indispensable minimum. The chimney, of handsome but not excessively substantial design, has a base 11 feet square; but from the floor level to a height of 8 ft. 6 in., it is carried upon the side-walls only, 3 feet thick—the centre being an arched passage, 5 feet wide, through which the coal and coke from the south side of the house were wheeled. The site of the works is the ancient bank of the River Dee, and the subsoil is of a character very unsuitable for deep excavations; being composed chiefly of river sand, mud, shingle, ship-yard refuse, and tips, and offering very little resistance to the percolation of tidal and surface water. These circumstances would have made the construction of an adequate subway both dangerous and expensive; the foundation of the chimney would have been imperilled; and the water difficulty would have involved excessive outlay. The alternative of raising the walls and constructing a stage floor 10 feet above the ground floor was therefore adopted. The position of the house presented another difficulty. The site is bounded on one side by the River Dee, and on the other by the viaduct of the North Wales main line; the end walls being about 30 feet from either. On the south side is the coal-store, running the full length of the house. On the north side is the coke-yard. The adoption of a coke-conveyor would therefore necessitate a triple motion—first longitudinally in the house, then transversely to the coke-yard, and finally parallel to the house for stacking. The excessive cost of the installation, and other reasons, prevented the introduction of this method of handling coke—a subject I will refer to later.

It being necessary to bring all the coke out to the north side, the new furnaces were placed on the south side of the benches, so as to have the least quantity of coke to remove from that side of the house. The old roof was a double gable, the valley being supported upon deep wrought-iron girders extending from either side of the chimney to the end walls—the ends resting in pockets in the chimney and walls. The roof was constructed of wood, with cast-iron struts and wrought-iron tension rods, sheeted with match-boards, and slated. It was in excellent condition; but the valley and girders were a barrier to its further use, and when the walls of the house were raised, it was removed, and a single span trussed iron roof of light but strong design substituted.

Doubtless the question will be asked, "Why not have adopted inclined retorts?" To this I will only refer now to point out that the excessive height of house required for inclined retorts could not be safely obtained by raising the walls of the existing building; and the additional expense of an entirely new house was out of the question. In addition, the information I was able to obtain as to costs of installation and working results with inclines was so unsatisfactory that I did not feel justified in recommending their introduction. To have adopted this system would have entailed a much heavier outlay upon the alterations—a new retort-house if the same increase of producing capacity was to be obtained—and an extension of the time allowed for the execution of the work, which would have made our position last winter perilous in the extreme. The only alternative—horizontal retorts and manual stoking machinery—was therefore adopted.

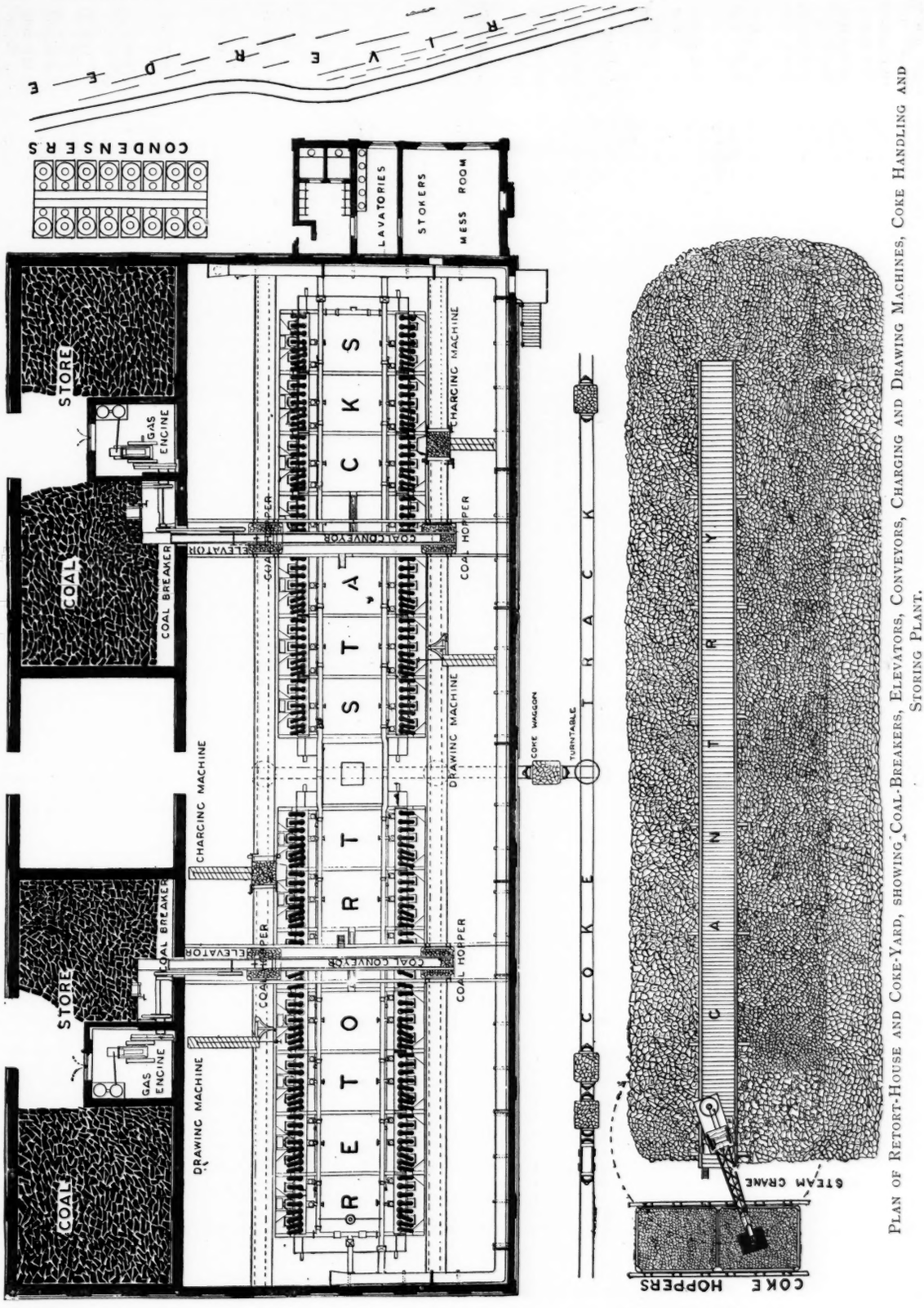


Cross Section of Retort-House and Coke-Yard, showing West's Coal-Breaker, Elevator, Conveyor, Charging and Drawing Machines, Coke Handling and Storing Plant.

The scheme of general arrangement as set out in the report was accepted by the Directors on Dec. 18, 1899; and the complete specification and plans were passed on Jan. 25 following. The contract was signed in February; and the work of removing the old roof was commenced on April 2. So that not much grass was allowed to grow under foot after the "fall of the flag." It was, of course, necessary to carry out the work in such a manner that the manufacture of gas should be interfered with as little as possible; and, in fact, from start to finish, there was not the slightest interference with the regular supply—the men cheerfully accommodating themselves to the inconvenient conditions under which some of their work had to be carried on. By the time one-fourth of the roof had been removed, the eight beds in the end of the house nearest the river were sufficient for the daily production. A barrier was then drawn across the house at the chimney, and the remainder of the roof over the other half was removed. The addition to the walls and the new gable at the railway end of the house were then carried up, the new roof put on and slated, and stoking operations transferred to that half. The splendid ventilation now obtained was a boon to the stokers, but very obnoxious to the men above engaged upon the second half; and compliments and other expressions were freely exchanged when stoking was going on and volumes of smoke and steam enveloped "the men on the roof."

I will not trouble you with details of the roof, beyond saying that the height of the walls was increased to 31 feet. The roof-principals are 8 feet apart centres, the rise is 15 feet, and the covering is of slates secured to the angle-iron purlins by copper ties. This method of fastening the slates I had previously adopted with success on roofs where other fastenings had failed; and though the slaters strongly objected to it in this instance, and declared their disbelief in its effectiveness, it has so far disappointed their prophecies of disaster, and resisted the fierce nor'westers which blow with unmitigated severity full upon the retort-house—not a slate has been blown off since the roof was completed. The ventilator is supported upon the main rafters, and is 10 feet wide and 2 ft. 6 in. above the main roof. It is capped with strong grooved tiles carrying an ornamental crest, which gives a nice finish to the whole. In either gable are three openings, which, with the old openings along the side walls, afford ample light to the stage-floor and upper works, and greatly assist the ventilation. This portion of the contract was completed by the first week in October. The openings left in the walls for the passage of the elevators were boarded up, and the work was suspended for the winter. I must, in justice to the contractors, remark that it is significant of the care exercised throughout that no accident occurred during these alterations to their own employees or those of the Company, if we except the case of one man who, having imbibed "a drop too much," took a "drop" of another sort by falling from a roof principal on to the retort-bench—fortunately escaping, as men in that condition often do, with very slight injuries. Needless to say, he was promptly "dropped" again—this time off the job!

The more arduous task of reconstructing the carbonizing plant itself was commenced in the second week of February, 1901; the earliest date when four arches of the old bench could be dispensed with. Gas-producing operations were transferred to the first half of the new benches in August; and the last of the contractors' men and materials left the works the week before Christmas—a very creditable performance when the difficulties in the way of the contractors are considered. The plant as reconstructed consists of two benches of seven through arches, each containing sixteen stop-ended retorts in settings of eight, back to back. Thus the number of retorts is unaltered; but whereas the old ones were 9 feet ovals, the new ones are ⌂-shaped and 10 feet long. The piers are 11 feet centres, 16 ft. 9 in. high to the springing, with three 4½-inch rings rising 1 ft. 9 in. The spandrels are filled with grouted brickwork carried up five courses above the arches, making the total height of the bench 21 feet from the ground floor. Below the stage floor, the width is 22 ft. 6 in.; the extra width being required for the furnaces on the south side. Behind the furnaces, solid work is carried up between the two sets of gas and air passages to the level of the springing of the furnace arch, which extends the full width of the bench. The combustion chamber above this is divided in the centre by the main division wall of the setting, and equal distribution of the furnace gas in both compartments is easily obtained by the four corner dampers over the inlets to the main flue. The waste gas and secondary

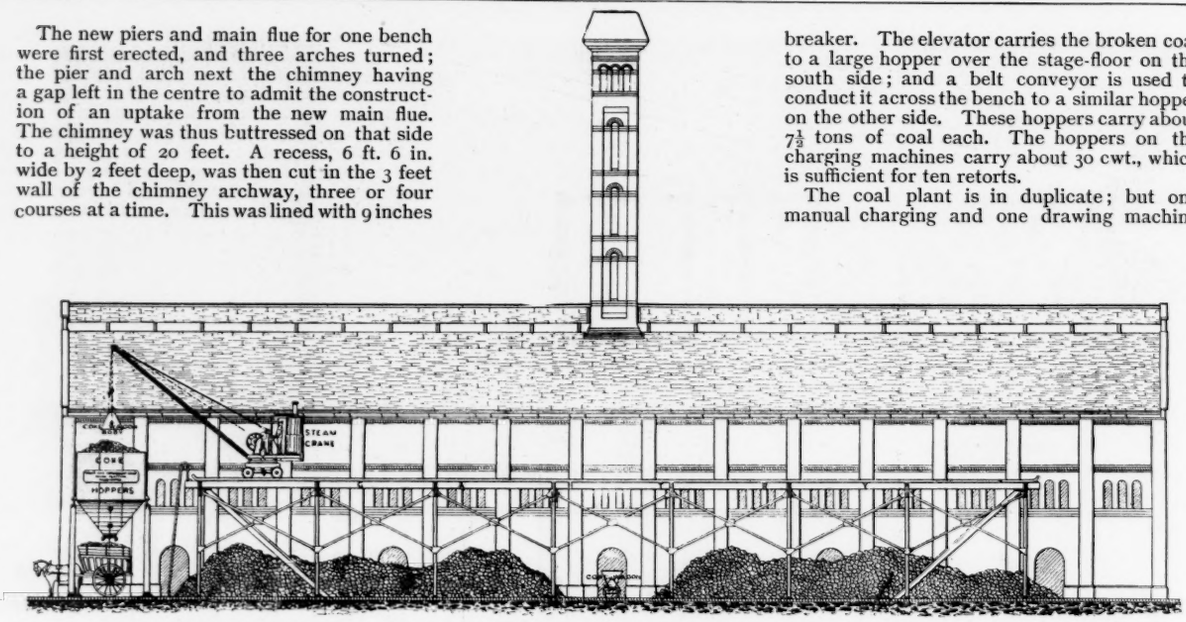


PLAN OF RETORT-HOUSE AND COKE-YARD, SHOWING COAL-BREAKERS, ELEVATORS, CONVEYORS, CHARGING AND DRAWING MACHINES, COKE HANDLING AND STORING PLANT.

air passages are of the ordinary alternating type, but of special construction; and so effective are the means adopted to prevent it, that, after twelve months' continuous working at fairly high heats, there is not a suspicion of bye-passing. In place of the circular regulators usually doing duty as primary air inlets, the clinkering doors are fitted with rectangular openings regulated by vertically sliding covers secured with wing nuts, by means of which the re-adjustments necessary after Sunday and other stops are readily obtained; a wooden gauge being used for setting the slides.

The main flues call for special mention, on account of the problem they presented in designing the plant. The old benches were 10 feet high, and the main flues were on the top and entered the chimney on either side by an arched opening, 3 ft. by 2 ft. 6 in., 9 ft. 6 in. above the ground floor. Eighteen inches below these inlets to the shaft, the archway I have mentioned divides the base transversely to the main flues, leaving only 3 feet of brickwork on each side. The chimney is about 110 feet high, with a very heavy stone coping. Its condition was very bad; a fracture in its centre extending from the concrete foundation to more than half the height. It was necessary to construct the new main flues on the ground level, and make use of the existing chimney; the idea of pulling it down and erecting new chimneys not being admissable. It was doubtful if the chimney would stand when the old arches were pulled down; but to minimize the risk of collapse, it was thoroughly overhauled, pointed, and braced with about sixteen bands as a preliminary to the ordeal.

The new piers and main flue for one bench were first erected, and three arches turned; the pier and arch next the chimney having a gap left in the centre to admit the construction of an uptake from the new main flue. The chimney was thus buttressed on that side to a height of 20 feet. A recess, 6 ft. 6 in. wide by 2 feet deep, was then cut in the 3 feet wall of the chimney archway, three or four courses at a time. This was lined with 9 inches



ELEVATION, SHOWING COKE-HANDLING PLANT, WITH CRANE FOR STORING COKE IN THE COKE-YARD, AND OVERHEAD COKE-HOPPERS, FOR FILLING CARTS, &c.

of fire-brick, and the pier was built up at the same time with 3 inches of recess on the chimney side, leaving a flue 5 feet by 1 ft. 6 in., which is equal to the area of the old main flue. Fifteen inches below the springing of the old inlet to the shaft a new arch was turned, the radius being 2 ft. 6 in; thus the soffits are in line. The completion of this portion of the work without any disturbance of the equilibrium of the chimney was a cause for no small satisfaction; and the similar work on the other side was undertaken with a lighter heart.

The new ascension, bridge, and dip pipes are 6 inches internal diameter throughout. There is a separate hydraulic main to each bed, quadrant shaped in section. These have square end-plates of $\frac{3}{8}$-inch steel riveted to the cross girders connecting the buckstays. Cast-iron saddles, also bolted to the cross girders, carry the 12-inch foul mains, connected by weir-valves to the hydraulics—the weight being thus kept off the bench. Each section of hydraulic is also connected by a valve at the bottom to a 6-inch tar take-off main emptying into a syphon below the ground floor, whence the tar is drained to the tar-well in the yard. The rectangular condensing main already mentioned could not be refixed on the south side of the house, on account of the coal-elevators being on that side. It has therefore been re-erected in two tiers, which extend along both ends of the house and the north side. The lower tier is carried on cast-iron brackets as before; but extension pieces have been fitted to the brackets and connected by suspension rods to the roof principals, which are thus made to relieve the strain upon the wall. The upper tier of main is supported on open cast-iron distance pieces resting upon the lower tier, so leaving the whole accessible for examination. Reversed swan-necks at either end of the house connect the 12-inch mains to the condensing main; and 12-inch valves permit of the gas being sent to the annular condensers by long or short circuit.

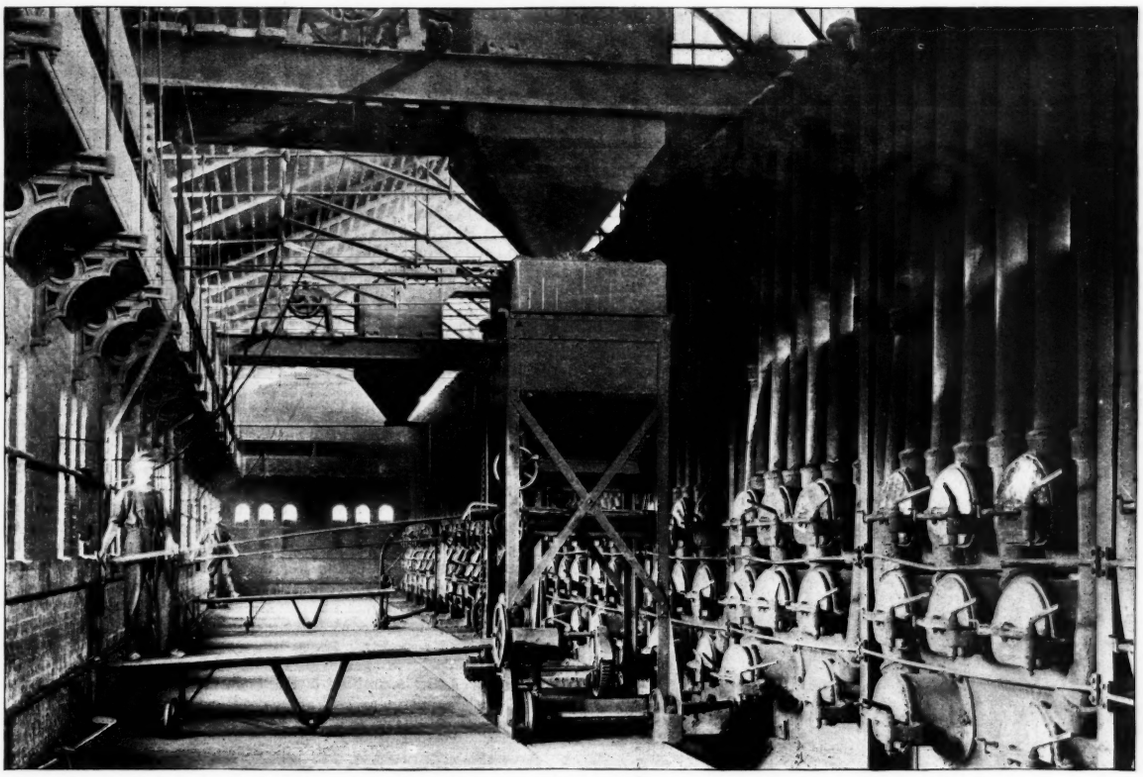
Along the front of the benches is an opening between each pair of floor-girders, to which a steel shoot is fitted; and the coke, as drawn, falls into this, and is received in waggons on the ground floor. The stage floor is carried upon H steel girders, 11 feet apart centres, except at the chimney, where they are 12 feet apart. These girders are bolted to the buckstays, and rest in pockets in the house wall. They are further supported by a cast-iron column under each, 6 feet from the wall. Portland cement concrete is used for the floor arches; the spandrels being filled up with same, and the floor formed of hard, blue bricks on edge bedded and grouted in cement. The men's mess-room is built out at the north-west corner of the house; and near to it a new cast-iron staircase and landing outside give access to the stage-floor. The staircase is covered in with corrugated iron, so that the men are not exposed to the weather in passing to and fro. There are also two vertical iron ladders in the recesses between the central buckstays and the chimney, for the more ready passage between the ground and stage floors.

The coal-handling plant, though an all-important feature of the reconstruction, does not call for extended description, being of the well-known type supplied in conjunction with West's stoking machinery. It is driven by a gas-engine contained in an apartment built within the coal-stores. Adjacent to the engine-rooms, are the breaker pits. These are below the coal-store floor, and are of 18-inch brickwork in cement, upon a substantial bed of concrete. They are 9 ft. 6 in. deep by 12 ft. 6 in. by 11 ft. inside measurement, and so arranged that the coal—which has all to be carted into the works—can be tipped from the carts on to the breaker. The elevator carries the broken coal to a large hopper over the stage-floor on the south side; and a belt conveyor is used to conduct it across the bench to a similar hopper on the other side. These hoppers carry about $7\frac{1}{2}$ tons of coal each. The hoppers on the charging machines carry about 30 cwt., which is sufficient for ten retorts.

The coal plant is in duplicate; but one manual charging and one drawing machine on each side of the house suffice for the stoking work. The storage-hoppers are supported on strong H steel girders spanning the house and resting at the centre upon a transverse girder carried on cast-iron columns standing on a brick pier built on top of the benches. The heads of the coal-elevators are accommodated in two dormers, projecting 14 feet above the roof and sheeted with corrugated iron. There are two windows in each dormer, to give light for lubricating, &c. Provision is made at each end of the house for elevating materials to the stage-floor. The two centre floor plates at the outer end of each bench are of cast iron, and rest on trimmers between the end buckstays and along the outer wall. The plates can be lifted at the centre and turned back against the bench and wall. Near the top of the buckstays, an angle iron, bent to an inverted V, is bolted to the stays, and carries one end of a steel rail; the other end being secured in the outer wall. This rail is of sufficient strength to support lifting tackle and any load which is likely to be required. The numerous arched doorways in the retort-house wall somewhat interfered with the arrangement of the stage-floor girders, and necessitated cutting out most of the arches and substituting H steel joists, upon which these floor girders rest. Their appearance in the external elevation is not prepossessing. But in work of this kind utility is the chief consideration; and here it was a case of "Hobson's choice."

I have mentioned some of the reasons which led to the decision not to introduce hot-coke conveying plant. The work of last winter, when coke was a drug on the market in our part of the country, and the greatly increased output due to the reduction of fuel consumption in the furnaces necessitated extensive stacking, demonstrated the necessity for some mechanical means of effecting this; and a brief description of the plant which has been adopted will conclude this paper. In front of, and parallel to, the retort-benches, 2-feet gauge tram rails are laid in the ground floor, having a turn-table at each end of the archway beneath the chimney. A line extends transversely from the turn-table on the south side to the coke-yard on the north, where is fixed another turn-table; and the line is extended from this both ways parallel to, and 14 feet from, the retort-house. Twenty-four feet from this line, a gantry, 20 feet high, is erected; the framework and bracing being entirely of steel. The columns stand in cast-iron shoes bedded in substantial concrete foundations. On rails on the gantry (6 ft. 6 in. apart centres) is a locomotive steam-crane, capable of lifting 25 cwt. at a radius of 25 feet. Near to the end next the railway is a coke-hopper, capable of holding 35 tons, and having two sliding outlets underneath at a sufficient height to allow of the free passage of loaded carts.

There are 14 steel-bodied tipping waggons provided, each capable of holding the coke from three retorts; the bodies having a central axle at each end, by which they can be lifted from the carriages. The coke being drawn from the retorts falls through the stage-floor shoot into the waggon; being partly quenched during the operation. The waggon is then run on to the turn-table, slewed round, and run under a drenching arrangement outside the house, where quenching is completed. It is then picked up by the crane and tipped into the hopper or on to the coke-stack as may be required; the act of tipping the load being very neatly effected by a special arrangement of the crane-gearing actuating the tipping-chain and allowing the skip to be lowered to any position, so that the coke is not broken by having a distance to fall. This plant has now been at work for some weeks with very satisfactory results, and will no doubt effect considerable economy in dealing with the



VIEW OF INTERIOR OF RETORT-HOUSE, WEST'S MANUAL CHARGING AND DRAWING MACHINERY, AND OVERHEAD COAL-HOPPERS.

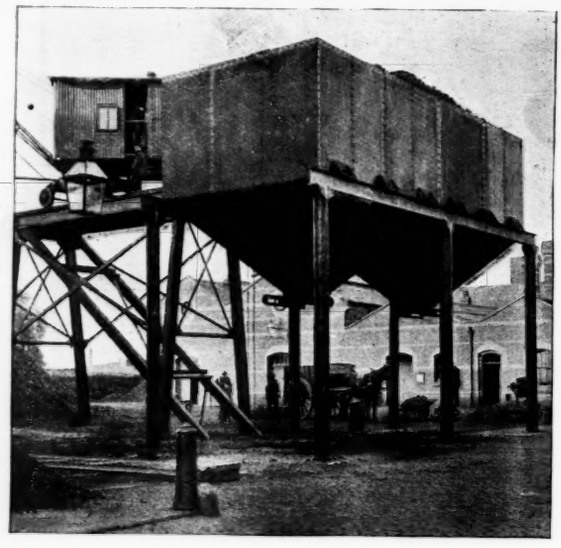
coke. At the same time, the initial cost and the wear and tear charges are only about half what they would be for conveyors of only one-third the efficiency.

Now a few words as to working results, and I will leave this rather threadbare relation to your tender mercies. In designing the reconstruction of the retort-house and plant, I had three objects in view: (1) To obtain the maximum producing capacity within the area of the existing house; (2) to effect an appreciable reduction in the fuel and labour costs of carbonization; and (3) to provide efficient carbonizing plant without unnecessary outlay for new buildings. These objects have been attained, and with results which will prove very satisfactory when time has been given them to be fully developed. The original producing capacity of the old house, allowing for every retort being efficient, was 1,232,000 cubic feet per diem. The capacity of the new plant, on the same basis, is 1,860,000 cubic feet—an additional producing capacity of over 50 per cent. within the same area. The contractors guaranteed a make per mouthpiece of 8000 cubic feet per diem. We have had the plant at work for thirteen months, during the first three of which the whole staff of stokers had to

STEEL COKE GANTRY, LOCOMOTIVE STEAM-CRANE, AND COKE-HOPPERS.

be trained to methods entirely new to them, and the average make for that period has been nearly 8500 cubic feet per mouthpiece. This has been obtained without any undue forcing of the plant—a fact which is sufficiently substantiated by the retort fuel account.

Formerly, the direct-fired furnaces and shallow generators combined consumed over 26 lbs. of coke per 100 lbs. of coal carbonized. The consumption in the new furnaces—carefully ascertained for the ten months ending June last—is only 10·33 lbs. of coke per 100 lbs. of coal. What the saving amounts to upon 23,000 tons of coal is easily calculated. The coke sold for the twelve months ending June last was 10·33 cwt. per ton of coal carbonized, as against 6·72 cwt. previously. We thus have in the same house, and on the same floor area, a plant which is capable of producing 50 per cent. more gas per diem with less than three-fifths of the fuel expenditure required by the old methods. In addition, we have thoroughly efficient coal and coke handling plants; and the entire reconstruction, including these plants and the alteration of the house, with all new machinery and appliances, has cost slightly under £80 per mouthpiece. The men highly appreciate the vastly improved conditions under which their labour is performed, and would be very sorry to go back to the toilsome methods of former years.



A Nearer View of the Coke-Hopper.

I have purposely refrained from offering any details of costs of carbonization; one reason being that we had to work through last winter without the coke plant now installed, and another being that at present there is no settled and accepted basis of comparison. The figures one occasionally hears given as the "costs of carbonization" are so evidently incomplete and disingenuous that I am content to let that subject rest until a fair method of comparison can be arrived at. No two works are "on all-fours" in regard to the conditions and circumstances which affect these costs; and the partial statements which are volunteered are more often misleading than correct. Useful discussion—except upon the basis of a full disclosure of every fact affecting the costs in each works compared—it is absolutely hopeless to attempt.

I would have preferred deferring this paper until after six months' clear working with the plant as now completed. The results for the past half year do not fairly represent the capabilities of the plant, owing to the absence of the coke-handling machinery. I hope at a future date I may be allowed to place before you the actual working figures arrived at with the completed plant. I can, however, satisfy inquiries to this extent—that for the half year ended June last, notwithstanding the tremendous drop in coke prices and the absence of coke-handling machinery, there was an actual gain of over £830 due to the six months' working with the new plant.

Discussion.

The President (Mr. Charles Hunt) said that Mr. Belton had put the members under great obligation by giving them such a clear description of the improvements effected at the Chester Gas-Works under his supervision. It was a class of paper that did not admit of discussion; but he was sure Mr. Belton would be pleased to answer any question arising out of it.

Mr. J. Ferguson Bell (Derby), having asked whose furnace Mr. Belton had adopted, said the author was to be congratulated on the way he had carried out the alterations at his works. The members would be only too glad at a later date to know the results of the working under the changed conditions; and if Mr. Belton would allow them to see the plant in operation, it would add to their obligation. The improvements and extensions seemed to have all been executed at a very moderate cost. Personally he should like to see Mr. Belton's coke plant. In the paper, it was said that the plant put down was more efficient than a coke-conveyor, and that it was less costly—in fact, about one-third of the cost. The author, however, did not say what coke-conveyor he was referring to; and he (Mr. Bell) thought the statement was open to some amount of—well, qualification.

Mr. G. Helps (Nuneaton) asked whether the 10·33 cwt. of coke sold by Mr. Belton per ton of coal carbonized included dust and ashes, and whether he thought he was likely to continue to sell this quantity as the settings became older.

Mr. W. R. Cooper (Banbury) inquired the size of the retorts referred to. The author stated that they were 10 feet long; but he did not give the other dimensions.

Mr. Belton, in reply, said he quite recognized that the paper did not lend itself to discussion—in fact, seeing that, as he had said, he had not yet had an opportunity of fully testing the capabilities of the plant, owing to the coke machinery having only recently been set in operation, he rather avoided discussion until further experience had been obtained. As to Mr. Bell's first question, he should be pleased to answer it by post, as he did not believe in advertising anybody's furnaces or anything else. As to the coke plant, he said in his paper that it had three times more efficiency than that of conveyors. The idea of a conveyor was to carry the coke from the retort-house and stack it in the yard; but he was only speaking now of the capabilities of a conveyor in depositing the coke in the hoppers and stacking it in the yard. The most that a conveyor could do in the length of yard at disposal (150 feet under the gantry) would be 1000 tons; but, with his plant, he could stack 3000 tons, and, with little inconvenience, 3500 tons. Therefore, he did not think he had overstepped the mark in saying the plant adopted had three times the efficiency of a conveyor. As to the quality of the coke. Hitherto the coke had been forked into carts, and the breeze scraped up with a shovel and conveyed to the boilers, where it was consumed in the Meldrum furnaces; and all the rest had been taken out for sale with the broken coke. The refuse used under the boiler was the refuse breeze from the coke yard. This would account for the coke being thoroughly clean. As to maintaining the figure of 10·33 cwt. per ton, he did not think they would have any difficulty at all in doing that. They did not anticipate getting, at any rate, above a consumption in the furnaces of 12 lbs. of coke per 100 lbs. of coal after they had been longer in use, so that he did not think the 10·33 cwt. of coke sold per ton of coal would not be maintained. He was sorry he had overlooked including the size of the retorts. They were 22 in. by 16 in. by 10 ft.

The President, on behalf of the members, thanked Mr. Belton for his excellent paper, and for the admirable manner in which he had illustrated it.

GAS AND ELECTRICITY DEPARTMENTS IN COMBINATION.

By S. Meunier, of Stockport.

[A Paper read before the Midland Association of Gas Managers, Oct. 11, 1902.]

The subject which I have been requested to bring before your notice to-day is rather a difficult one to deal with, inasmuch as there are at the present moment only a small number of undertakings combining what have for so many years past been considered as rival interests—most of them of comparatively short existence; so that the facts and figures obtainable are few, and, unfortunately, do not cover a period sufficiently long to be altogether suitable for comparison. However, this cannot be avoided at present; and it will be as well to consider more the ideas suggested in favour of such a combination than any figures which are at the moment available. The competition based upon this idea of rival interests has no doubt acted in the past as a beneficial stimulus, and has undoubtedly helped to materially advance both gas and electrical engineering. But the time would appear to have been reached when it might be considered advisable to at least review the position, and see whether this antagonism between what, after all, are twin industries working in the same fields, though by different methods, should not be stayed and replaced by a combination of forces to the mutual advantage of both.

More especially does this appear to be necessary just now when the established gas and electrical undertakings are being threatened with the competition of powerful syndicates who propose to supply gas for power purposes on the one hand, and electricity in bulk on the other, at prices which, to the general public, appear most tempting and alluring. The latest comer, the Cheshire and North Staffordshire Electric and Gas Power Syndicate, propose to combine both schemes, and to distribute their products throughout Cheshire and the northern portion of Staffordshire from three stations, situated respectively at Sutton, near Macclesfield, Stone, Staffordshire, and Frodsham. The price for gas is not stated but that to be charged for electric current in bulk is given at 2d. per B.T.U.; the rights of the various local authorities who may wish to distribute the current throughout their districts not being encroached upon. Now the average cost per B.T.U. sold of all

the undertakings given in the "Electrical Times," works out as follows: Works cost, 1·85d.; rent, rates, taxes, management, salaries, office, and legal expenses, 0·72d.; interest, sinking fund, &c. (taken on corporation undertakings only), 1·77d.—total, 4·34d. per B.T.U.

Supposing that a local authority agree to take such a supply, and to distribute themselves, there should be added to the 2d. per B.T.U. practically most, if not all, of the 0·72d. for rent, rates, management, &c. (due to the fact that separate offices, &c., would be required), and the interest, sinking fund, &c., belonging to the distributing system, &c. (say, one-third of the whole average of 1·77d.—viz., 0·59d. per B.T.U. sold), making a total cost to the local authority of 3·31d. per B.T.U., or an apparent saving of 1·03d. per unit. But, as you are well aware, in any undertaking as the output becomes greater, the cost per unit of production due to the permanent or standing charges tends to be reduced—*i.e.*, the capital expended on land, buildings, mains, stand-by plant, &c., together with the items of management, office, collecting, generating staff, &c. Of these, the items least affected are capital on distributing feeders and mains, cost of collection, &c., as they are more quickly utilized to their full capacity. So it can be seen that the Syndicate, as the manufacturer, have in their hands very much the heaviest percentage of possible saving; while the local authority, as the distributor, have the least. The position of the consumer may be easily foreseen. Yet there are undertakings generating current at a figure enabling them to sell at the same, or a very little higher, price; and no doubt others will follow in their footsteps. But it is suggested that a more general adoption of the system of amalgamation would strengthen the position of suppliers, and enable them to meet this threatened competition by material reduction in costs.

As to its probable effect upon our special industry, little need be said. No doubt all of you have given full consideration to the whole matter, and are quite prepared. But it must not be overlooked that the cheapest turning power for small and intermittent loads is electricity, and that producer gas, generated *in situ*, comes into favourable competition with coal gas for motive and heating purposes when the latter exceeds from 1s. to 1s. 2d. per 1000 cubic feet, and can probably be separately manufactured, distributed, and sold at a figure equivalent for coal gas to from 1s. 4d. to 1s. 6d. per 1000 cubic feet. A manufacturer, therefore, need only instal gas-engines driven from this producer supply, or, if already using such with town gas, change over, put down a dynamo, and he is at once lost to the gas department, both for power and light; or, if he has been using current from the town electrical supply, for either or both purposes, to that also.

The main factors brought forward in support of these large power and electric light schemes are concentration on suitable sites, and consequent economy in capital expenditure and working expenses. These factors, it is suggested, hold good, and can be just as well obtained by the establishment of electricity stations on the site of existing gas-works. In the majority of towns, these are situated quite sufficiently near the point of distribution for all practical purposes; and with such as are not, it simply resolves itself into a question of system or method of supply or expenditure on feeders, and I venture to think that in but very few cases would the advantages be outweighed to such an extent as to make absolutely necessary the establishment of an independent station.

The reasons which induce one to believe in the advisability of combined gas and electrical undertakings are as follows: In the establishment of either the question of expenditure on capital account is a most important one, and has a lasting bearing upon the future of the undertaking. The evolution of years and the growing needs of the gas industry, necessitating the study of many subjects, have so added to the requisite training and knowledge of the large majority of gas engineers and managers of today, that they are fully competent to design and carry out all the many and various kinds of structural and engineering work embraced in the modern type of gas manufactory, at least 80 per cent. of which may be held to apply equally to electricity stations. Such, so far, has not been the usual training of his electrical brother, with a consequence that the necessary work in connection with a town's electricity installation has to be placed in the hands of at least two, if not three, different gentlemen, each of whom no doubt does the best possible to carry out his section in a good, sound manner, which shall be satisfactory to his employers and creditable to himself, but rarely with any consideration as to the future financial results of the undertaking. The consequence is that the engineer-in-charge has so much more per B.T.U. to provide for on capital account than he should have had had he been in the position to carry out the whole of the work himself. We have had instances years ago of the same kind of thing in the gas industry, and the consequences still act as a handicap on the undertakings concerned.

Figures obtained from the "Electrical Times" show that interest and sinking fund charges still account for over 40 per cent. of the total cost of supplying current, though this is a material reduction on what was required five or six years ago. By establishing the electrical station on the gas-works site, there would, in the majority of cases, undoubtedly be a large saving on the first cost of land, if only for the fact that it has probably been bought by the company or corporation years back at a much lower price than would have to be paid at the present time, and that if more is required the neighbouring land is not usually of such a valuable character as that near the centre of an electricity supply district. The gas engineer, from his previous training and experience, would be quite capable of designing the necessary arrangements, buildings, &c.; and the structural cost could be minimized by reason of the situation and its usual surroundings. The machinery and plant would, of course, have to be of the most suitable kind, so that any saving upon this item (if any) could only be small, and would be due mainly to there being, as a rule, plenty of material suitable for foundations on a gas-works. The cost of feeder cables might be slightly higher, though it does not necessarily follow, as many gas-works are situated near the centre of chief supply.

In the majority of towns up to 30,000 inhabitants, and in some of even larger size, as shown in the "Electrician" tables, a further saving in capital charges could be obtained by having the electrical plant driven by gas-engines. I am informed that at one town in Staffordshire the estimate of capital for a supply by this means was only about £7000, against £14,800 for steam-plant. The following figures, taken from the "Electrician" tables for 1900-01, may be of interest as showing the wide variations in capacity of plant installed, and the possibility of a more extended use of this system of generation:—

Population.	Kilowatts Installed.		
	Maximum.	Minimum.	Average.
30,000	1125	170	417·8
20,000	890	85	273·1
10,000	680	42	217·0
5,000	150	36	89·4

It is noticeable that the average capital per kilowatt installed, taken from all the undertakings, irrespective of the length of time they have been in operation, is now £94, or over £10 less than was the case five or six years since; while that of the few combined stations I have been able to obtain information about stands at £57 per kilowatt, as against £68 per kilowatt when they were originally installed.

As regards the cost of generation, the advantages are in favour of the system suggested. The special arrangements usually laid down for dealing with gas-works material are equally available when required. Fuel of a suitable kind for a steam plant—such as breeze or coke—is manufactured on the premises, and can be utilized with advantage either by itself or mixed with slack, as is shown by the results obtained at four works whose particulars were kindly sent to me. They are as follows:—

1.—First half year of working . . . 0·65d. per B.T.U.
2.—First year's working . . . . . 0·36d. ,, ,,
3. ,, ,, ,, ... 0·46d. ,, ,,
4. ,, ,, ,, ... 0·51d. ,, ,,
5.—Second ,, ,, ... 0·32d. ,, ,,

Such results will, I think, compare very favourably indeed with those obtained for similar periods at electricity stations as usually installed; while there is an additional advantage in having a useful outlet for fuel which would otherwise have to be placed on the market. We are now using nearly 100 tons of coke breeze alone per week. When the plant is gas driven, a further element of economy can be shown, as the saving of distribution charges, collection, leakage, &c., will enable a supply to be given at a price which will realize a reasonable profit for the gas department, while being a cheap and profitable source of power. In the majority of instances, it would be quite possible to work with a smaller staff than is usually necessary in an independent station, by careful arrangement of the engine and boiler house, where the latter is required. The number of boilers needed as a reserve could likewise be materially reduced by this method of combined plant; and no doubt there are many other ways in which you will be able to see savings could be made, if you had to apply such a scheme in connection with your own particular works.

In the case of Stockport, the gas and electricity stations are about 200 yards from each other. The economies effected by the combination, although perhaps not quite as great as they might have been had the same site held both installations, have been very noticeable. Outside of large contracts, both new and repair work has been carried out by the workmen of the Gas Department; thus assisting to fully utilize their services. Machinery, &c., which would in an ordinary way be standing nearly half its time if used only for either, has been practically kept going. In the fitting-shop alone, work is done annually in connection with our electricity supply amounting to from £300 to £400. The rapidity with which repairs are carried out, and the more detailed supervision and attention which can be afforded to the plant generally, are sources of saving. The taking of meters, collection of accounts, keeping of stores, and general office work are also done by the ordinary clerical staff—so far with no additional assistance, with the exception of one clerk at the station itself—and there is not the slightest doubt that we save on this item alone quite £300 per annum. The costs of all work are carefully kept, and strictly apportioned to each department. Many other indirect advantages, difficult to enumerate, have been found, owing to the facility with which men and material can be manipulated when required at short notice.

Electricity undoubtedly offers many advantages, and the demand for it is bound to increase. Cost, however, at the present

moment is the great impediment; and the problem of how to reduce this is engaging the attention of all connected with the industry. By combining matters in the way suggested, the solution of this problem can, I think, be materially assisted. That at the same time a profit can be realized, has been shown to be possible by some of our brethren in charge of electricity works. Compare a loss of £101 the first year, and a profit of £81 the second year, at one works; a profit the first year of £472 at a second works; or a profit of £130 the first year, a loss of £198 the second year, and a profit of £80 the third year at a third works—the loss of the second year having been paid off before the profit for the third year was reckoned—or a profit each year since the commencement amounting in three years to £2419 at a fourth works (depreciation, interest, and sinking fund all having been properly attended to), with the results one reads about in the papers, and it will be seen what the possibilities of the subject may be. Unfortunately, as mentioned before, there are not enough examples to enable one to absolutely demonstrate the probability of success.

The electrician also should derive benefit by being brought into close touch with, and afforded an opportunity of studying the methods and systems employed in an old established industry whose day of usefulness is by no means over. Undoubtedly there are many things contained in the practical politics of a gas engineer's every-day duties which his electrical brother has had little opportunity to study or experience to profit by. On the other hand, the training which he has received is of a different calibre to that which falls to the lot of the majority of us; and the incentive this would be could not help but be beneficial. It is to that amalgamation of the practice and experience of over a century in the one industry, allied to the technical and scientific training of the other, that we may look forward for the advancement and future success of both, and for the establishment of a still higher standard of knowledge and position for those entrusted with the care of such important undertakings.

Another effect of such a combination of the two industries would be that better remuneration than is usually found on either side could reasonably be asked for, as it would be to the interest of employers to pay a good salary to one man, rather than a moderate one to two. I am afraid I have placed this important question before you in a very imperfect manner; but the time at my disposal has been small, and the sources of information very limited. It is one that I feel strongly upon, and I trust to see ere long that amalgamation of the old and the new blood which cannot but be of benefit to the lighting, heating, and power branch of the engineering profession, and to the community at large.

Discussion.

The PRESIDENT (Mr. Charles Hunt) said he felt the members would all agree with him that Mr. Meunier need not have made any apology at the end of his paper, which was an admirable one, and set forth the subject in a lucid way.

Mr. J. FERGUSON BELL (Derby) said that, having had the control of both electricity and gas works, he should like to draw Mr. Meunier's attention to the fact that all the electrical journals were very much opposed to the combination of the two works. Coming to the meeting that day, he happened to buy an electrical paper; and he saw a note about Mr. Foster coming to Birmingham from Leigh, Lancs.; and the Corporation of the latter place were now going to have a separate engineer for the electrical works. The paper (which, by the way, was "Lightning") rejoiced at the fact. All the papers he noticed generally objected to the combination of the two works. There was a feeling that the gas management would not give the electrical department fair play. He did not know whether there was anything of the kind at Stockport; but the feeling seemed to be very general that, if an electrical department was placed under the domination of the gas department, the former would not have the scope it would have otherwise. Personally, he thought there was a great deal to be said as to the combination of the two departments, especially in the smaller towns; but when it came to the large towns, it was just possible—he should say it was probably better—the departments should be under separate management, as there would then be sufficient scope and full work for two engineers. Mr. Meunier referred to the gas and electric power schemes. These were things of the future; and they had yet to prove they were able to make a dividend. A number of them were looking forward to the working of these schemes with very great interest. He himself had considerable doubt about them, because, as a matter of fact, if anyone wanted gas power, it was far easier to put down a small producer to make the gas. The same applied to electricity. If anyone wanted electricity, the cheapest way was, no doubt, to put down a gas-engine and dynamo, and then he could get as much current as he liked at 1d. per unit. In connection with gas and electricity combinations, a question that Mr. Meunier had raised was an important one, and one that was often lost sight of—that was, the economy in fuel. There was something in that, as there was often a certain amount of refuse about a gas-works that could be utilized in an electrical works. Then, again, in the accounts and the secretarial department, there was a saving there. Whether under one engineer or not, his experience pointed to this, that the gas and electricity undertakings should be under separate committees, because, when the two concerns were only under one committee, a certain amount of friction took place, and this was saved. Another thing he should like to emphasize, and it was that where the electricity department was under the gas engineer, the capital account was not likely to be squandered or inflated, as it was in a number of electrical departments. He had in mind certain towns in which there were electric lighting installations that would have such an awakening during the next few years that they little dreamed of now. The subject was one worthy of full discussion.

Mr. H. P. MAYBURY (Great Malvern) remarked that he for one had a very deep personal interest in the subject of the paper. With the author, he certainly thought, in the smaller towns, it would not be a disadvantage to have the gas and electrical undertakings under one engineer. He had at this moment an electrical scheme being carried out, and the gas-works site was being utilized for it. There were several installations now under the charge of gas engineers, and doing very well. Take Wallasey, for instance. The installation there was started some five years ago, and Mr. Crowther had made a profit ever since. The accounts were kept absolutely separate; but, of course, it might be that there was a little bit of saving, or a little bit of credit, due to the gas-works. As Mr. Bell had said, the great reason why the electrical installations up and down the country were showing such bad results was on account of the excessive capitals; and this was due largely, as the author himself had pointed out, to the fact that they usually had three or four engineers for a scheme. And, he said it with all modesty in the presence of the President, this was largely due to the consulting engineer. That gentleman had an interest in spending as much as he could, and after he had got his 4 or 5 per cent. on the expenditure, away he went back to Westminster—leaving the engineer in charge to make the best he could of his heavily capitalized works. He did not agree with Mr. Bell as to the duplication of committees. Personally, he would rather have one committee to deal with than three or four.

Mr. W. LANGFORD (Longton) sympathized with the author in respect of the few installations over which he had had a range to compare. He (Mr. Langford) found his works stood first on the author's list for fuel account; and it would be noticed that it came out at 0·65d. per Board of Trade unit. This, he should explain, was for the first half-year's working. They started without any customers, and they did not canvass. They simply took on their customers as they came. The 0·65d. would be reduced—perhaps by half the amount—if they took the twelve months' working. In his opinion, it was much better the two undertakings should be in combination, and that they should be under one Committee and one management. When he went to Longton three-and-a-half years ago, his Committee had applied for a Provisional Order for the supply of electricity; and they had a report from a consulting engineer in regard to its likelihood of paying, and the size of the works required for the borough. But, on going to Longton, he found the gas-works required a good deal of attention; and he hesitated somewhat over taking up the designing and erecting of the electric lighting works as the Committee wanted him to do. However, in about eighteen months, he had surmounted his difficulties at the gas-works, and then the Committee renewed their request. He consented; and he had since erected electricity works costing £20,000. They had been working now for about nine months; and he was very sanguine that, in the course of one or two years' work, they would be able to make a small profit. But great care had to be exercised over the expenditure of capital and over the supervision of the works generally. The tendency was, where there was not a combination with the gas-works, to put on too many "cloth" men for the supervision of the electricity works. This did not do, as one had to be very careful not to embark too heavily in management expenses. He quite agreed with the author as to the saving resulting from combination in the office and staff expenses. They had the office and they had the staff; and, for the first twelve months at least, he thought they could go on without any help in the electrical department. If they wanted an engine-fitter to repair any little difficulty in their engines, they could call the fitter from the gas-works, and charge the time occupied against the electricity works. In his case, the electric services were also put in by the gas-service layers, who were taught the work by the contractors who laid the electric cables. There were many savings and many indirect advantages arising from combination that it would have been impossible to enumerate in the paper read that afternoon; but, in time to come, Mr. Meunier would no doubt be able to show them those advantages much more clearly and readily than he was now able to do, seeing that the introduction of combined electric light undertakings only took place a few years ago, and that there were very few examples.

Mr. G. HELPS (Nuneaton) said in his case the electricity department was in the hands of the Local Authority; and he was particularly anxious at the present time to discover if he could what were the costs of electricity generation. He noticed in the paper the works costs were given at 1·85d. He should like to ask the author whether that meant the actual generation of the current only.

Mr. MEUNIER said the "works costs" included fuel, oil, wages, maintenance, and things of that kind; and the total cost included rent, rates and taxes, and management expenses besides.

Mr. HELPS said he noticed, in the presidential address of Mr. Walker, at the meeting of the North of England Association of Gas Managers, the figure of 0·35d. was given as the cost of generation in his case; and at the meeting someone took exception to it.

In the present paper, the lowest figure for fuel only was given as 0·32d., as against Mr. Walker's 0·35d. as the cost of generation. He (Mr. Helps) was certainly a little in the dark.

Mr. H. FOWLER (Derby) said that the figures from the "Electrical Times" did not seem very clear; and he should like to know if they included large and small works. The works costs given seemed to him to be exceptionally high. Then as to the expense of putting down a small producer plant for generating electricity. His neighbour in two respects (Mr. Bell) he knew made a great point of the installation of gas-engines for electric light; but in the case of a man who did not require to light after 5.30 p.m., and only needed electricity for motive purposes during the day, he (Mr. Fowler) certainly thought that the capital cost of putting down producer plant, and the fact that a small plant would require at least a continuous 10 or 15 horse power in order that it might work anything like efficiently, while probably the man would only require ½-horse power during certain hours of the day, would not pay. He might add that he recently had an opportunity of seeing a good-sized combined motive power and lighting plant at a works where they had water gas; and where they got their steam by using slack coal, and employing the gas given off during the blow for driving the gas-engines. They had used this for some time; and they said it had given very real satisfaction.

Mr. MEUNIER, in reply, said he was much obliged to the President, who, as a judge of papers, had had wide experience, for stating that he did not consider any apology was needed from him (the author) for this one. But one naturally liked to feel satisfied with the results of his efforts; and he could assure the members that personally he was by no means satisfied with the paper. This was mainly due to the fact that he had not been able to obtain all the facts and figures which he required to prove that his ideas were correct or otherwise. He could have easily given more figures in regard to his own undertaking; but that was not a satisfactory procedure to readers, who might come forward and say: "Yes, that is all very well, but you may have some exceptional advantages." This he was anxious to avoid by obtaining information from elsewhere to prove his ideas as to the possibility and desirability of the combination of gas and electrical undertakings. The whole of the figures he wanted he could not at present get; but in the course of another year or two, engineers who he knew were taking the matter in hand would have had the opportunity of showing what they could do in what was at present a foreign industry, but not so foreign as they might think. Then they would be able to get the figures and facts of which they were at present short. Mr. Bell had had a pretty long experience; and he (Mr. Meunier) obtained some figures from Stafford. He found that at Stafford there were some exceptional circumstances, so that the works had not shown quite so well as the other town that had been mentioned—viz., Wallasey. When the two towns were compared, one could easily see where the difference arose, and which accounted for the difference in the results. In the first place, Mr. Bell happened to be among the sufferers on capital account. His original figures worked out at £97, while Stockport only worked out at £51. Mr. Bell had also spoken about the electrical papers being much set against the idea of the gas engineer having anything to do with electrical matters. He might safely have gone further, and said that they considered, or some at any rate, that gas engineers must necessarily start prejudiced against anything electrical. He (Mr. Meunier) begged to differ from this point of view very strongly indeed. His experience of the few cases of gas engineers who had taken up the electrical side of the question, had been totally opposed to any such view. They had used their experience obtained in conducting a gas undertaking, and they had endeavoured to keep down expenditure which they could see very plainly was not going to be remunerative; and for that reason electrical engineers and committees turned round and said they had tried to bolster up their old undertakings at the expense of the new. He believed the commercial experience of the gas profession was the very thing needed to make a success of electrical undertakings. At the same time, he felt very strongly that electrical undertakings were bound to come. Electricity was needed if only for advertising purposes. It also improved the town, and gave facilities which at present gas could not do. He felt they ought to have it as a friend, and not as an enemy. As to what Mr. Bell said, as to friction——

Mr. BELL: I only referred to the friction caused by the charge as to the Gas Committee not giving the electric light sufficient push.

Mr. MEUNIER said there had been nothing of the kind at Stockport. There was a little friction between the Tramways and the Electricity Committees, because the former said they were the largest consumers; and they ought to take full charge of the electric lighting department as well as the tramways. But they had yet to see how that "panned" out. He was also perfectly satisfied, with Mr. Bell, that combination was the right thing; but, of course, in such large cities as Birmingham, Manchester, Liverpool, Sheffield, Edinburgh, and Glasgow, where the undertakings were of such magnitude, no doubt they should be kept separate. There was in such undertakings plenty of work for separate engineers and staffs, both mechanical and in every other way. Therefore, he should not advocate combination in those cities; but for medium and small towns, where the people, as a rule, had a difficulty in making the electrical concern pay, then the combination was the better of the two systems. Mr. Bell also said something with regard to gas and electrical power schemes not having proved yet whether or not they would earn a dividend. That was so, because at present they were in the clouds. But if they took notice of Mr. Walker's presidential address, there was a point at which they did pay; and he should quite anticipate that, under the conditions he had specified, they were likely to pay—that was to say, in a district such as he had, and under the same conditions. There, too, they had a peculiar combination for power and lighting, and had obtained an enormous and a regular load. Mr. Walker's Company alone were sending out 3 million units a year, and that was a large station indeed. A considerable amount of the current was required for motive power in the shipbuilding yards. In the district they had an ideal supply for electricity, and an ideal of economy in the distribution of power for the purposes for which it was required. They covered an enormous area from a central point, and carried the necessary current over that area with a small amount of loss—the loss from the cables was practically *nil*. But they could not do that with gas nor steam. Regarding gas-engines and producers, Messrs. Crossley were doing an enormous business in making gas-producers. Town gas supplies had by no means the capacity that they used to have in this respect; and Messrs. Crossley told him that the idea at present, where they were putting down large gas-engines, was to supply producer plant with them. Mr. Maybury mentioned one little point that had undoubtedly a great effect—that was, the heavy outlay on capital was due in many instances to the consulting engineer. This was a point he (Mr. Meunier) was trying to draw attention to when saying that the work had to be placed in the hands of two or three gentlemen. But let them place themselves in the place of the electrical consulting engineer. He had to put on record a sample of his ability and of his work. He had not, however, to carry on the undertaking afterwards; and people could then turn round to a particular portion of his work and either criticize it or else say that it was very good. If they were in the place of that consulting engineer, they were not likely to go to the length of economizing down in every little detail in the same way they would do if they were subsequently going to try to make the profit out of the plant. No doubt, too, the question of the payment by percentage on cost could be brought in. This was a point a good many corporations were now realizing when they took on consulting engineers; and many of them now often fixed the expenditure at a dead-level. He had in mind a beautiful plant that, in his opinion, had cost twice as much as it need have done. Mr. Langford was right as to the 0·65d. for fuel applying to his plant. But that was only for six months working; and he (Mr. Meunier) anticipated that it would be materially reduced. Mr. Helps spoke about the cost of generation, and as to Mr. Walker's figure of 0·35d. per unit. This was the effect of the unique position Mr. Walker's undertaking occupied, as already explained, and the purposes for which the current was used. If they could utilize their electrical machines and run them on full load for the whole day, or for ten or twelve hours at a stretch, they would find the costs would be materially reduced. But it was not possible to do this with an ordinary electric light station, from the fact that the maximum load did not last more than 1½ to 2 hours a day. They would find that in an ordinary electric light station a variation in the output of current of from about 30 to 40 amperes per hour up to 1000 amperes. But the 1000 amperes would only last about an hour, and so it would be easily understood that the stand-by charges for fuel would send up the costs. When they were working on a dead-load, it made a great deal of difference. He might mention that a member of his Committee had a large electrical motor put down for a trade industry; and this ran with a straight 10-hour load, and sometimes 12, and sometimes 14—once the machine was started it was never stopped until the end of the day. They sold him current at 1½d. per unit; but he found he was losing money very heavily indeed. By special arrangement, the price was reduced to the lowest figure at which they felt they could supply him. This was carried on for three months. Then he had to give it up, although they were supplying him at ¾d. per unit. He found he could drive his machinery by steam at practically the equivalent of ½d. per unit. Where there was a dead, steady grind of that sort, electric current "was not in it" with steam; but for an intermittent load, or for small machines, it did come in. He was rather struck by the point introduced by the last speaker, as to a water-gas plant being used for a particular purpose, and the blow-gas for driving gas-engines. This was rather a new feature, and it showed the possibilities of gas for electrical purposes.

The PRESIDENT said that they had had a most interesting, and, in some respects, unique, discussion. Mr. Meunier had gone very fully into all the points that had been raised; and he (the President) thought that this was almost the first time that a meeting of gas managers had been engaged in showing how an electrical undertaking could be worked to the greatest advantage. He fully agreed that there were many economies to be effected by having gas and electricity combined under one management—not the least of these being the utilization of the common sense and experience of the gas manager. In support of this, he thought it could be shown that some of the most successful electric lighting undertakings were in the hands of gas managers. Moreover, to a certain extent electricity was as much a necessity as gas. It had a sphere of usefulness of its own. But they ought not to forget that, over a very wide field, gas and electricity were, and

must continue to be, rivals. This placed the manager of the two supplies in a somewhat difficult position, unless, indeed, he were content to be neutral. But ought he to be so contented? If a consumer came to him for advice as to which illuminant he would recommend, what should be his answer? His knowledge of their capabilities made only one answer possible, but at the risk of exciting suspicion that he was unduly favouring gas. It was said of old that no man could serve two masters; and he was greatly disposed to recommend them to let electricity alone, and make the best fight they could for gas, which was incomparably the best illuminant. He felt, indeed, that the introduction of electricity had been a distinctly retrograde step in artificial lighting, as compared with incandescent gas lighting; and he was of opinion they ought not to let any idea of being able to cheapen the cost of electricity stand in the way of doing their utmost for gas, which they could honestly recommend as the superior and cheapest illuminant. Reference had been made by various speakers to extravagant expenditure by consulting engineers; but, of course, this applied to electrical—not gas—engineers. (Laughter.)

SOME OF THE QUESTIONS INVOLVED IN THE SLOT-METER SYSTEM CONSIDERED.*

By George Helps, of Nuneaton.

[A Paper read before the Midland Association of Gas Managers, Oct. 11, 1902.]

The object of the present paper is to submit the following propositions:—

1.—(*a*) That when piping, fittings, &c., are supplied free—the hire charge for the use of same being included in the price of gas—the average quantity of gas sold per slot consumer should be such as will provide in the sum of the extra amounts charged slot consumers per 1000 cubic feet more than ordinary consumers, sufficient to pay for all extra work (work over that required by the ordinary consumer) and pay for the service, piping, and fittings supplied within ten years. (*b*) Or that the sum total of the extra charges for depreciation and free work per average slot consumer deducted from the cash received per average slot consumer, will leave at least such an amount per 1000 cubic feet to pay for the gas as will bear reasonable comparison with the amount per 1000 cubic feet charged to ordinary consumers.

2.—That, apart from the possibility of a slot-meter system being remunerative, it must be considered as not based on sound business principles, when its foundation rests on a system of averaging consumers whose consumption varies from 1000 cubic feet to 50,000 or 100,000 cubic feet per annum (a ratio of 1 to 50 or 100), by reason of the unfair manner in which the large consumer—who has to bolster up the system—is necessarily treated.

3.—That the method for proving the net return from a slot business should be by keeping a strict cost account of all services, meters, fittings, &c., in use by slot consumers, the cost of collection, free repairs to fittings, &c. (in some cases even the cost of the mains), and charging the requisite annual depreciation against the slot consumers' receipts.

At the present time, services may be considered as laid, &c., free and gas supplied (1) at certain rates per 1000 cubic feet through ordinary meters for which an annual rent is charged; 2) through slot meters in combination with fittings and grillers at an inclusive rate; (3) at certain rates per 1000 cubic feet through ordinary meters for which no hire charge is made; (4) at certain rates per 1000 cubic feet through slot meters in combination with fittings and cookers—a separate rent being charged for the cookers; (5) through slot meters in combination with fittings and cookers at an inclusive rate; and (6) at certain rates per 1000 cubic feet through slot meters—all fittings belonging to the consumer. Probably there are other combinations not quite covered by the foregoing.

Of the six systems cited, those most generally in use are cases 1 and 2; and these only need be compared, as it will be quite clear that whatever conclusions can be drawn from a consideration of them will apply to all the others in a degree proportionate to the positive and negative factors respectively implicated. For particulars of cases 3 to 6, see Appendix A.

Before the first proposition can be considered, it is necessary to base-line (as it were) the cases to be compared, by seeing that they are really identical or balanced in the several conditions, so that the differences are clear and precise. As an example, let it be assumed that a gas undertaking has the opportunity of selling a quantity of gas—say, 20 million cubic feet—to either ordinary (supplying services and meters only) or slot consumers (supplying the necessary services, meters, fittings, &c.).

* Slot-meter system in these notes refers to the supplying of services, slot meters, piping, fittings, and gas at an inclusive rate per 1000 cubic feet. When slot meters are used in place of ordinary meters, and no gas-fittings, &c., are supplied, there can be no question but that the slot meter serves a most useful purpose.

Let 2s. per 1000 cubic feet be the cost of the gas, including repairs and maintenance of works, plant, and mains.
Let 1s. per 1000 cubic feet be required to pay full dividends.
Let the meters to be used be all 3-light; and, in the case of ordinary consumers, one-tenth of the prime cost of them be charged as rent to cover the necessary depreciation.
Let the average consumer, slot or ordinary, consume 10,000 cubic feet per annum. (See Appendix C.)
Let the cost of fitting up a slot house with service, meter, fittings, and griller be £4 10s. (See Appendix B.)
Let the life of the services, meters, fittings, &c., be considered as ten years, and that it is required to find the price at which gas can be sold to cover these requirements. (See Appendix D.)

Cases I. and II. can now be readily compared on these lines.

Case I.—*Gas Supplied through Ordinary Meters for which an Annual Rent is Charged.*

The cost of fitting up a house with service and ordinary 3-light meter, leaving the consumer to provide fittings, would be about—

¾-inch service (tubing and laying)	£0 18 0
3-light ordinary meter and fixing	1 2 6
	£2 0 6

Seeing, however, that one-tenth of the meter is charged for in rent, there is the service only to consider, costing 18s.

The number of consumers of 10,000 cubic feet each required to take 20 million cubic feet will be 2000.

The capital employed, 2000 services at 18s. each = £1800.

Revenue Account.

To cost of 20 million cubic feet at 2s. per 1000 . .	£2000	By sale of 20 million cubic feet at 3s. 2¾d. . . .	£3180
To depreciation (one-tenth of £1800)	180		
To balance, being profit required at 1s. per 1000 cubic feet	1000		
	£3180		£3180

The price at which gas must be sold to ordinary consumers is then 3s. 2¾d.

It is now necessary to inquire into the capital that would be employed if the same quantity of gas—20 million cubic feet—were sold to slot consumers on a similar basis, but through slot meters, and with fittings and grillers provided.

Case II.—*Gas Supplied through Slot Meters in Combination with Fittings and Grillers at an Inclusive Rate.*

The capital to be employed in the sale of 20 million cubic feet of gas to slot consumers, and the result in revenue, can then be calculated thus:—

Consumers required to take 20 million cubic feet at 10,000 feet each = 2000.
Capital employed in fitting up 2000 consumers at £4 10s. each = £9000.

Revenue Account.

To cost of 20 million cubic feet at 2s. per 1000 . .	£2000	By sale of 20 million cubic feet at 3s. 10⅛d. . . .	£3900
To depreciation one-tenth of £9000 (10⅛d. per 1000 cubic feet)	900		
To balance, being the profit required at 1s. per 1000 cubic feet	1000		
	£3900		£3900

Here the price at which gas must be sold to slot consumers is thus 3s. 10⅛d. per 1000 cubic feet.

Clearly, then, under the conditions assumed, the slot consumers should be charged 3s. 10⅛d. − 3s. $2\frac{4}{25}$d. = 8⅜d. per 1000 cubic feet more than ordinary consumers.

Note.—In the case of slot consumers, the depreciation per 1000 cubic feet, when the cost of the installation is £4 10s., and the average consumption 10,000 cubic feet, is 10⅛d.; the depreciation per 1000 cubic feet for every £1 expended on capital being 2⅜d. If, therefore, £1 more is expended per house, 2⅜d. must be added to the extra price charged per 1000 cubic feet, or the average consumption increased by 2222 cubic feet, and a corresponding amount deducted if less is spent. An expenditure of £4 10s. corresponds with 10,000 cubic feet consumption. Therefore an expenditure of £1 corresponds with 2222 cubic feet consumption. Where the average consumption does not reach 10,000 cubic feet, the difference should be increased. Where a cooker costing £2 is used, 4s. more depreciation per consumer is required, and a further quantity of 4444 cubic feet per annum should be consumed, bringing up the required average to 14,444 cubic feet—or, say, 14,500 cubic feet.

In arriving at this difference of 8⅜d.—say, 9d.—per 1000 cubic feet, nothing has been charged for extra clerical and other work in connection with the slot consumers over and above that with ordinary consumers. The increased risk of invested capital, the cost of free work, and other disadvantages, have been only partially assessed. Even mains are sometimes laid expressly for slot consumers; and where this is the case, why should not the charges to slot consumers cover the interest on the outlay? The special booking and supervision alone of this class of work cannot probably be systematically done for any less than (say) £125 per annum per 1000 consumers—3d. per 1000 cubic feet.

Doubtless there will be many who will not accept this figure; and it will be interesting to know what figure they suggest, and on what basis they found it. There has been a talk of ⅛d. per 1000 cubic feet and ½d. per consumer per annum; and there were some other figures, supposed to emanate from Glasgow and Bradford, of 0·202d. and 0·081d. per 1000 cubic feet. The former figure represents £8 8s. per annum, or thereabouts, for 1000 consumers. Probably these figures were meant to refer to the use of slot meters only. If 3d. be adopted, the extra charge should be 1s. per 1000 cubic feet. Therefore, in the present case, slot consumers should provide 1s. per 1000 cubic feet, which is the figure called for by the first proposition on the basis assumed, in addition to that of the price charged to ordinary consumers.

Now, with regard to those who wish to make concessions in price to the consumers on the slot system. It has been argued that the reasons for a reduced price are:—

1.—That the slot consumer is a cash customer.
2.—That the consumers on the slot system utilize the mains and plant of a gas-works to some extent when it would otherwise be practically idle—that it develops a day consumption, in fact, and necessitates no additional capital, expenditure for mains and gasholders on its account.

Query. Are there any other advantages?

If these considerations were admitted for the sake of argument, surely even then the slot consumer could only be exempt from providing any interest on the capital expended in holders and mains. Holders and mains, &c., are generally taken as about 40 per cent. of the total capital of a concern; and on this assumption, if ordinary consumers provide 1s. per 1000 cubic feet profit on the capital, the slot consumers' proportion would be 7⅕d.; or a reduction of 4⅘d. per 1s. profit found by ordinary consumers. The difference, taking this most favourable view, is still 7¹d. per 1000 cubic feet. But can such a price be considered as bearing a reasonable comparison with that of the ordinary consumer? Surely slot consumers invariably consume gas at night during the time there is the heaviest draft on the holders and mains? Opinions on these points will be very interesting.

The question of principle is now reached. The "JOURNAL OF GAS LIGHTING" and the "Gas World" have been searched for the past six years; and all the writers on the subject appear to practically agree that it is the average consumption which governs the profit or loss where the slot business is concerned. This being so, it must also follow that, where the individual consumptions vary from 2000 to 50,000 or even 100,000 cubic feet, the large consumers are most unfairly taxed. The very small slot consumer is the only one who benefits by this most troublesome business. The large slot consumer, the man taking 50,000 cubic feet per annum, is the one who keeps the average up. Such a large consumer pays 50 × 1s. = 50s., 50 × 9d. = 37s. 6d., or, on the more favourable basis, 50 × 7⅕d. = 30s., which after deducting 4s. 2d. per annum for meter-rent leaves 40s. 10d., 33s. 4d., or 25s. 10d. per annum in perpetuity for fittings which probably only cost as much, if that, originally. If he does not realize the disadvantage to himself of the system, does his overlooking it remove the responsibility of the gas undertaking to act honourably and uprightly with him and all their consumers?

There are cases known to the writer where a slot system being in operation, all consumers using a slot meter are called upon to pay such a sum as 1s. per 1000 cubic feet extra, when perhaps all the fittings belong to them. Some writers, recognizing the principles which should govern business, have suggested that, after the average consumption had been reached, the gas consumed above such quantity should be charged at the ordinary rate, and that this could be done by allowing a discount or rebate; the sum representing such to be handed to the consumer at each visit of the collector, or put back into the meter by him to pay for a corresponding quantity of gas to be consumed.

Such suggestions as these certainly express an anxiety on the part of authorities to treat the large slot consumer with fairness. But, unfortunately, to practically carry out the idea is impossible, as the responsibility it would be necessary to invest in that collector is far too great, and, probably, from an accountant's point of view, it is almost absurd. More important still, it appears to have been overlooked that such a scheme would upset the system of averages; for if the profit from those who consumed above the required average quantity were not taken advantage of for the purpose of bringing up the general average, what would be the result? Would not the whole slot business fall to pieces? It would seem, then, that some other solution of the difficulty must be looked for by those who do not freely admit it to be insuperable, and that the second proposition is not proven.

The third proposition, which more or less only accentuates the first, will, it is hoped, be admitted by all. There are well-known instances where the slot system is a dead loss—only that it is hidden from private and public view, by being mixed up in the general accounts. Again, may it be asked, why should not slot consumers be called upon to pay the charges of mains laid expressly for them? If facts were more eagerly sought for, and, when proved, admitted, the cost of administering some slot businesses would be found to be considerably in excess of the charges assumed in this paper. That the necessity for keeping very strict accounts of different departments has only recently been recognized, would seem to reflect on accountants' departments. For a concern hiring (say) 100 pianos, it is not a very difficult matter to effect the necessary entries in the books, or to keep an eye on the pianos. But where all kinds of brackets, pendants, boiling rings, and their adjuncts are concerned, which probably are continually being repaired, removed, or exchanged—to say nothing of the changing of tenants—it is another matter. Is there any commercial concern—other than gas—which would expend £4 or £5 in sundries, such as gas-fittings, &c., and fix them in many of such houses as are now fitted up with slot fittings, on similar terms?

The justification of those who think they can afford to spend £5000 or £50,000 on the slot business, and pay it off in a few years out of revenue, and then pride themselves there is no necessity to consider the original outlay—that it is wiped out, &c.—may be understood by such as are governed by a void of business principles; but it is to be hoped that such are beyond the pale of the average man.

APPENDIX A.

CASE III.—Gas supplied at certain rates per 1000 cubic feet through ordinary meters, for which no hire charge is made. Where no charge is made for meter-rent with ordinary consumers, it is assumed the price charged for the gas includes the hire, so that the calculations herein remain unaffected.

CASE IV.—Gas supplied through slot-meters in combination with fittings and cookers—a separate rent being charged for the cookers. In this case, if the rent charged for the cookers is sufficient to cover the depreciation, and if the same is collected, all the gas used by the cooker would go, for the purposes of this discussion, to increase the average consumption.

CASE V.—Gas supplied through slot meters in combination with fittings and cookers. In this case, 10 per cent. depreciation being required to pay for the cookers, the necessary average must be increased accordingly. This average, on the basis of a profit of 1s. per 1000 cubic feet sold, would require to be increased by 2222 cubic feet for every £1 expended in excess of the £4 10s. allowed for.

CASE VI.—Gas supplied through slot meters, all fittings belonging to the consumer. In this case, some undertakings charge a little extra to cover meter-rent—some as much as 1s. per 1000 cubic feet—and others set the meters to pass the gas at the same rate per 1000 as ordinary consumers pay, waiving the question of meter-rent.

APPENDIX B.

1.—The average cost of fitting up a house from the main is generally accepted as about £4 10s.—viz.:—

Service (tubing and laying)	£0	18	0
3-light slot meter and fixing	2	2	0
Compo, 6s., three brackets 10s. 6d., a pendant and a griller, 13s. 6d. . . .	1	10	0
	£4	10	

APPENDIX C.

2.—The best average yearly consumption where the above fittings are in use may be taken as about 10,000 cubic feet. Now that the incandescent burners are becoming generally adopted, it must be perfectly clear that such an average is an extremely high one to accept. It would be interesting to know how many can claim it, and, if there is a town so far advanced as to supply their slot consumers with all incandescent burners, what the average consumption is. (If it is desired to include cookers, then, of course, the cost per house must be increased by the cost of the cooker, and the required average consumption increased accordingly. While it can be admitted that cookers are an advantage to the slot system when fairly used, the prices of them vary so largely that, for the purposes of this discussion, they are better left out.) Now it is generally admitted that one-tenth the cost of a slot installation must be written off each year to pay for depreciation. There are people who imagine that 10 per cent. is too much to charge; but the following considerations will probably convince them to the contrary.

APPENDIX D.

The Yearly Wear and Tear and Interest on Outlay.—The life of a slot meter may be put at twelve to fifteen years. The life of an ordinary cooker or griller at eight to ten years. The life of brackets, compo, and other fittings, seeing the risk of loss, wilful damage, and possible demolishing of house, &c., may be put down at 7½ years. The life of the service can be taken as ordinarily about fifteen years. But where the slot class of consumer is concerned, there is a risk of a large proportion of services put in dropping into disuse, as the tenants of slot houses are continually moving, &c.; so that the useful life of a slot service cannot well be taken at over ten years. Then, as the matter is to be dealt with independently of any other, it is necessary to charge a banker's interest on the outlay, which will be reduced each year as the principal is reduced. The interest chargeable should be 3½ or 4 per cent. Considering all these things, one-tenth cannot be any too much to write off annually.

Discussion.

The PRESIDENT (Mr. Charles Hunt) remarked that it had been said Mr. Helps had the courage of his opinions, and this he had proved in the paper he had read. Having thrown down the challenge, he (the President) hoped it would be accepted, and that they would have a good discussion.

Mr. R. O. PATERSON (Cheltenham), invited by the President,

said it was too bad of Mr. Hunt to call upon him to open the discussion, as there was hardly a word, a figure, a proposition, or a conclusion that the author had given or come to with which he (Mr. Paterson) did not disagree. That being so, with a view to saving the time of the meeting, he wished to be excused from saying more.

Mr. T. Glover (Norwich) remarked that, taking it that the author of the paper was in earnest, and not having a joke with the members, it was due to him that they should discuss some of the points, in order that he might go away from the meeting better informed than when he came. To start at the end, Mr. Helps asked, why should not slot consumers be called upon to pay the charges for mains laid expressly for them? Perhaps the *crux* of the whole question laid round such points as that. The slot consumers did pay for the mains, in the ordinary price of gas. Then all they had to do was to start with that, and add on to it the extra expenses incurred in supplying the slot consumer as compared with the ordinary one. The same thing applied to the services. Mr. Helps included the services as chargeable. He ought not to do so. The services were part of the fitting up of any consumer at the ordinary price, and the charge covered all capital outlay, including the service and the meter. All they had to charge for then, in addition to the ordinary price, to the slot consumer was (say) 10 per cent. on the additional outlay. An ordinary meter cost (say) £1 10s., and a slot meter £2. There was a difference of 10s. to start with; the fitting up of cottages cost £1 say; then if a cooker cost £1 15s., there was that to add. Taking 10 per cent. on these figures, and including any other little extra expenses and the meter-rent, they had the charge that they should make to the slot consumer, which would usually come to 9d. or 11d. per 1000 cubic feet above the ordinary price. He thought gas managers had generally proceeded on these lines; and they were perfectly safe. The system had settled down to an ordinary sound business thing; and by its means they were increasing the consumption rapidly. They were using their works plant and their trunk mains to better advantage by so increasing the number of consumers. He might say that in Norwich their heaviest hour's consumption was in Midsummer at noon on Sunday; and it was due to the fact that there were 10,000 cooking-stoves in use, and most of them were burning gas at that hour, when the mains would be lying idle if the cooking-stoves were not fixed. Some 8000 of the cooking-stoves were in connection with slot-meters; and they were doing the Company excellent service. He was sure it was a sound business if they went on in this way.

Mr. J. Ferguson Bell (Derby) thought the lesson Mr. Helps wished to teach them was not to spend too much capital on slot fittings and cookers. There were a few undertakings that went to the extreme in giving slot consumers elaborate fittings and expensive cookers; but, in the majority of instances, the slot business was being worked on sound business principles. He was sure the object of all gas managers was to deal equitably with all classes of consumers; and there was no reason why the working man should be asked to pay more than the rich. There was one important point Mr. Helps seemed to overlook, and that was, if they had a consumer using 20 million cubic feet of gas per annum, and lost him (which they might do by an installation of the electric light), it was a serious thing; but if they had 2000 slot consumers using the same quantity of gas, they were not likely to lose them all. He looked on the slot consumer as a great asset. In Derby he had 6000 slot consumers. Some time ago, he took out the actual consumption for the summer and winter quarters; and he found the slot consumers burning more gas in the summer quarters than in the winter ones. This was very important. It improved the load factor of the gas-works; and plant and mains that would otherwise be lying idle were being utilized.

Mr. Helps: Will you give us your average consumption?

Mr. Bell replied that the average consumption in Derby by the slot consumers was 10,000 cubic feet. The cost of fitting up the houses was only about 10s.; the houses in Derby being already piped. For this, of course, they only took in the boiling-burner and fittings. He asked the Secretary a few days ago what he estimated the cost of collection at for the slot consumers; and he told him ½d. per 1000 cubic feet. He saw Mr. Helps estimated it at 3d.; and he (Mr. Bell) thought that was absurdly high.

Mr. Helps: Can you give us the actual figure?

Mr. Bell: It cost ½d.; and this includes clerical work and all costs over and above the quarterly consumers. He might say that at Derby they did not fix cooking-stoves; but the probability was they would do so sooner or later.

Mr. John Young (Hull) observed that in comparing the prices charged for gas under the slot and ordinary systems, Mr. Helps should take into consideration that ordinary consumers paid something like 3d. per 1000 cubic feet extra by way of meter-rent.

Mr. Helps: That is taken into consideration, if you look into the paper, Mr. Young.

Mr. W. Langford (Longton) said he could not quite understand what Mr. Helps was driving at. The slot consumer, it seemed to him, was their best friend. In his town the average ordinary consumer used 50,000 cubic feet; but for six months during the year he used nothing. That was the manufacturer. When he (Mr. Langford) commenced the supply of the electric light, he found his gas consumption diminish, although they had half their consumers on the slot principle. He then propounded a scheme to his Committee for supplying houses on the slot system with fittings costing 40s. to 45s.; and now he found the average consumption was at the rate of 10,000 cubic feet per annum. This was the best class of consumer they could have, because through him they were utilizing idle plant. His experience was that the cost of collection was little more than for the ordinary consumers.

Mr. W. North (Stourbridge) thought Mr. Helps had made a very bad job of his case. He could assure him that he was perfectly satisfied to sell his 30 million cubic feet of gas through slot meters and to let Mr. Helps sell nothing. He could not at all understand Mr. Helps's argument. Although he had thought a good deal over the subject, he could never satisfy himself that they should separate the slot-meter gas from the other. They had not a separate plant for producing the gas. It came from one source, and was conducted into and by the same mains; and he could not see why they should not calculate it as they did the ordinary gas as to its cost price. If Mr. Helps would take his (Mr. North's) balance-sheet, he would see the whole of the costs were charged in the revenue account before they got out the net cost of the gas at the consumer's meter. That was the cost they should take. Supposing it was 20d., and they got 3s. 4d. for it—at that price they had 1s. 8d. to deal with. He held they were in a far better position through the slot system; and he defied Mr. Helps to prove they were making a loss. The system had helped him considerably. If they made a loss on the 30 millions used through their slot meters, then all he had to say was they made a right-down good profit on the other consumption, because they made a profit somewhere. (Laughter.) He was quite satisfied to go on in his own way. He had above 3000 slot meters; and he should like to have another 1000, and put them in at the same "loss." When his balance-sheets came out, notwithstanding all Mr. Helps had said, he found they were not so very bad.

Mr. T. Berridge (Leamington) said he thought Mr. Helps had only read his paper, in order that they might look the thing squarely in the face, to see how much they ought to charge slot consumers. He did not think Mr. Helps's idea was to give up slot meters. He only said they wanted to know where they were; and he was quite right. He (Mr. Berridge) believed in slot meters, and in charging a fair price above the ordinary to make them pay. The paper was a useful one; and they ought to be obliged to the author for it.

Mr. S. Meunier (Stockport) said there was one point they ought not to forget. That was, as to the great number of mains in a district upon which there were very few customers. They had never advertised slots in Stockport, nor had they attempted to push them. They had pushed themselves; and to such an extent that last year they fixed something like 3000. In nearly every case, they found the services and pipes were in the houses; and so they were practically drawing upon a class of consumers who, although provided as far as fittings were concerned to take the gas, had never yet come to them. It was their invariable rule now, when they were enlarging a main, or had to lay a main for special purposes—say, for public lighting—to just canvass up the street to see how many people would take the gas, and nearly every case—75 per cent. of the cases at all events—where they had a supply by automatic meters, had been people who had never had gas before. Therefore they must now be reaping a revenue from capital that was already expended, and which was previously bringing in nothing. It seemed to him they ought to take this point into consideration in arriving at the conclusion as to what was a fair price over and above the ordinary to charge the automatic meter consumer. They had found a benefit from the system; and they charged about 5d. per 1000 cubic feet extra on the gas so sold.

Mr. A. Graham (Mansfield), having remarked that he was reaping a great benefit from slot meters, said he should like to ask Mr. Helps, if he put on 9d. per 1000 feet in the case of houses to which he supplied fittings and stoves, what he would like to have where he supplied nothing but the meter. In his own case, he got a very good return on the capital invested in slot meters; and he did not know of an instance where they were a dead loss.

Mr. Helps: What do you supply the consumers with?

Mr. Graham: We supply nothing but the meter; and we give 25 cubic feet of gas for a penny.

Mr. Helps: Then my case does not apply to you. (Laughter.)

Mr. Graham: We lend the consumers a griller.

Mr. J. S. Cranmer (Stratford-on-Avon) was also of opinion that the slot meter was the very best friend to the gas supplier. At Stratford, they had three prices for gas—2s. 8d., 2s. 10d., and 3s. Upon these prices they made a profit; and the Corporation were well satisfied. Out of the profit, they were enabled to set aside a certain amount for sinking fund, and to pay something towards the reduction of the rates. Beyond these prices, in the case of the slot meters, they made a charge of 7d. per 1000 cubic feet where they did not supply any fittings whatever. The extra price was, of course, to cover the cost of meter-rent. In other cases, in some 300 to 400 small cottages, they supplied a good cooker, costing something like £2. He advocated this in the first instance. He felt confident, if they gave the cottagers something better than they had in the cottage stove, they would make use of it. He at all events had found this to be the case. They supplied them with three lights, either cross-light pendants or brackets, whichever they individually preferred. Of course, the fitting up of the house, either with iron or compo. pipe, was

necessary. The cost of this was entered against every consumer; and he could show Mr. Helps the amount standing against every one of them, as well as the amount of gas consumed, and the sum received from them. They also charged the repairs against the account; but up to the present they had been practically *nil*. Of course, this depended upon the class of consumer they had to deal with. A town like Stratford was very different from a large manufacturing town. The people went into a cottage, and remained there often the whole of their lives. In a large manufacturing town, the householders were constantly changing about, and were not so careful with the fittings as they were in a place like Stratford. Therefore, circumstances altered cases. He believed, if they charged 1s. 2d. per 1000 cubic feet more than the ordinary price to those consumers to whom they supplied a good cooker and pendants, it was about right. The cost of fitting up in this way was about £5 10s. per cottage. In every street in which they re-laid the mains, they laid service-pipes to all the houses; and he was looking forward to the time when every cottager in the town would be a gas consumer—to the unquestionable benefit of the Corporation and everyone else.

Mr. J. A. Harris (Wigston) said that among his ordinary consumers there were plenty whose gas consumption in the summer months did not come to much more than the meter-rent. But with regard to the slot consumers, they laid the service-pipe, fixed the meter, and gave a cooker costing about 35s. rent free and fixed free. This had been a success in Wigston. In the summer months, they got from 15s. to £1 from every one of the cottage consumers. They had, in fact, done uncommonly well. They had one street in which there were 80 cottages; and out of these they had 78 slot consumers, and only had two ordinary meters. He thought this was a record street. They had other streets supplied on the same basis. They only charged 5d. per 1000 cubic feet above the ordinary price, and found it paid them well. It meant a good deal of hard work for the manager; and he found there was a great deal in a manager going personally to look after the consumers.

Mr. J. G. Tooms (Waterford) stated that for some time they had treated the slot consumers in Waterford as nearly as possible the same as the ordinary consumers. Out of the money they paid, all charges for gas and the hire of fittings and stoves was deducted; and then they refunded the balance. They had had no difficulty so far. He did not think Mr. Helps had been arguing against the slot meter as a whole, but against making a loss on the system. He (Mr. Tooms) had slot consumers by whom there was a loss. For instance, if there was 10 per cent. of the consumers who did not consume more than 2000 cubic feet per year, there must be a loss on them if the whole were charged on one basis. If 10 per cent. of the consumers only consumed a small quantity, and perhaps for nine months did not consume anything at all, it was better to take out their meters instead of buying new ones. He had taken a good many out in this way, and had found it more profitable than buying new ones.

Mr. Helps, in reply, said he thought after what had been said that some of the speakers would be surprised to hear he was an advocate of slot meters. If some of the gentlemen who had taken him to task had only read the explanatory note in the paper, they would have seen that the slot meter system discussed by him referred to the supplying of services, slot meters, piping, fittings, and gas at an inclusive rate per 1000 cubic feet. When slot meters were used in place of ordinary meters, and no gas-fittings were supplied, there could be no question but that the slot meter served a most useful purpose. He thought, after the "slating" he had had, he might be allowed to say that there were only two gentlemen among those who had spoken who had followed his paper at all. Those two were Mr. Paterson and Mr. Young, both of whom said they totally disagreed with his propositions; but he had not heard any other speaker refer to the propositions or what was stated in the paper. Most gentlemen had run off on what they were doing in their own particular cases; and they had not taken the trouble, as he had hoped they would have done, to follow his paper. If they would only take the trouble to read the paper, and show him where he was wrong—show him the proposition that was wrong, and in what way it was wrong—then he should think that he had learnt something. But he could not learn anything from a lot of cases not analogous to those dealt with in the paper. Mr. Glover said that services and mains should not be taken into consideration in a comparison of this kind. The object of the paper was to show that the slot meter business was not an ordinary business—that, at least, was his (Mr. Helps's) opinion. If Mr. Glover thought it was not a different business, then he might run it as an ordinary business to his heart's content. He (Mr. Helps) knew a place where the average consumption per slot was 4000 to 4500 cubic feet; and the number of such slot consumers would be 50,000. If there was any gentleman in the room who said houses could be fitted up for a number of consumers at an expenditure of £5, and pay a profit with such a low average, he totally disagreed with him.

Mr. P. H. Fletcher (Evesham): Is that with a cooker?

Mr. Helps: I have left the cooker out.

Mr. Maybury: The price you suggest is very high without the cooker.

Mr. Helps said that, in looking through the "Journal," he found several places where the cost was between £5 and £6; and he had taken £4 10s. as a fair average. That was 18s. for the service; slot meter and fixing, £2 2s.; and compo., the three brackets, pendant, and griller, £1 10s. He did not think, if they wanted their fittings to last any time, that £4 10s. was putting the cost too high. Mr. Glover also said that the cost of the mains was already charged to the slot consumer. He (Mr. Helps) did not follow that. If they dealt with the slot consumer separately, then the mains should be taken into consideration. Mr. Bell thought that 10s. would cover the extra cost that had to be considered in dealing with the question. He (Mr. Helps) also totally disagreed with him. The ½d. per 1000 cubic feet, too, for which Mr. Bell said he could carry on his business, was also an extraordinarily low one. He (Mr. Helps) had been to some pains to get the exact amount that the slot consumers cost; but his figure did not come to anything like Mr. Bell's. He must ask Mr. Bell to point out where he was wrong, because if Mr. Bell could help him to reduce his costs, he should be deeply indebted to him. Mr. North followed in the same wake as the other speakers; and he said he did not agree in separating the slot consumers from the ordinary consumers at all. He (Mr. Helps) should still persist that, in estimating the profit between the slot and ordinary consumers, the costs must be divided. Mr. Berridge was kind enough to say he did not think he (Mr. Helps) was an opponent of the slot consumer; and he certainly was not. Mr. Meunier dealt with the cost of fittings, &c. Of course, this varied; and for that reason a case had to be assumed.

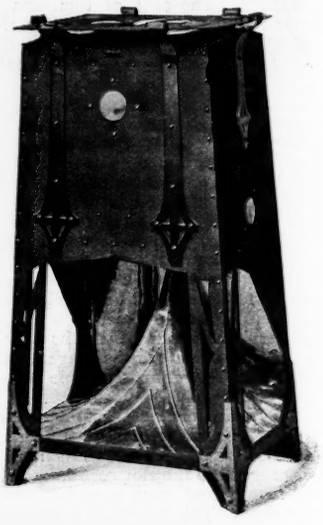
Mr. Meunier said that what he pointed out was that the consumer generally obtained in Stockport for slot meters was a class who had services and fittings in their houses, and who had not been slot consumers previously. He said the capital outlay on that which had been unremunerative should be taken into consideration in fixing the difference in price between the slot consumer and the ordinary consumer.

Mr. Helps said he quite agreed with that. As to Mr. Tooms's remarks, he did not think it a good system to hand back money through the collectors. It might interest the members to know that, while he had not lost any of his slot consumers, he had sold all the fittings they had in their houses, and what was more they were being paid for them. They had now considerably less trouble. They were selling the gas cheaper; and the consumers were more pleased than when the fittings were supplied free. One of the disadvantages in fitting up houses on the slot system was that people came, and they had nothing whatever to pay. They came and wanted their houses fitted up at an expense of from £4 to £6; and in most cases it was done—the gas supplier being altogether in the dark as to what would be the result. At Nuneaton, if a man wanted his house fitted up, they were eager to do it. But they simply asked him to pay a small deposit to cover the fittings—say, 5s., 10s., or even 15s., according to the amount of money they were going to spend on the house. If he said he would not pay the deposit, then they wished him, as readily and politely as they could, "a very good day," because they knew he was no good as a consumer if he could not pay 5s. [Several members questioned this.] When they made the alteration to which he had referred, of 1020 consumers, 300 paid for their fittings right off; and the remainder, with the exception of 280, were paying for their fittings by an increased rate per 1000 cubic feet. They sold the fittings for £765; and in the last twelve months they had received on this account no less than £260. The consumption was increasing; and they had no bother in having to keep special records for the fittings used by the slot consumers.

The President said, although the course of the discussion had not run quite in the groove Mr. Helps had desired, it had been a useful one, and at the same time they might congratulate the author of the paper on having stuck to his guns. He (the President) could not, however, agree with him in his conclusions, and must confess to being of the same opinion as the majority of the speakers. He did not see why Mr. Helps should, in estimating the additional cost of the slot-meter system, include the cost of the service. This, it appeared to him, should be eliminated, as also that of an ordinary meter—only the difference in cost between an ordinary and a slot meter being chargeable to the slot meter system. Nor did it appear to him to be right to stipulate that the consumer who desired to be supplied by means of a slot meter should pay for his fittings. If he were willing to pay for them, well and good; but to say that, because he could or would not pay for them, he was of no use as a consumer, was inconsistent with the object of the system. See what the latter, as generally applied, had done! The South Metropolitan Company, for example, had added about 130,000 customers to their books by its means, and were continuing to fix this class of meter at the same rate as for some years past. The system had been of almost incalculable benefit both to gas suppliers and also to the public; for, by its means, the convenience and economy of gas lighting had been brought within the reach of the humblest consumers. He hoped that Mr. Helps might be convinced that the surest way to attain this very desirable object was not to exact from the consumers payment for fittings, but to follow the practice which obtained in at least nine-tenths of the gas undertakings of the kingdom.

[Mr. Helps has sent for publication a few supplementary remarks on the discussion; and these appear in our "Correspondence" columns.]

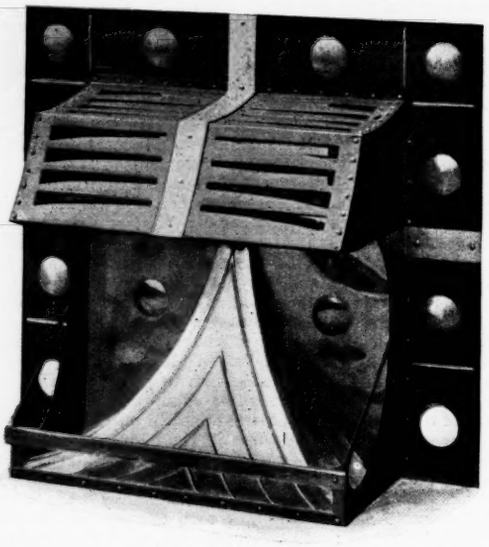
ARTISTIC GAS-FIRES IN THE NETHERLANDS.

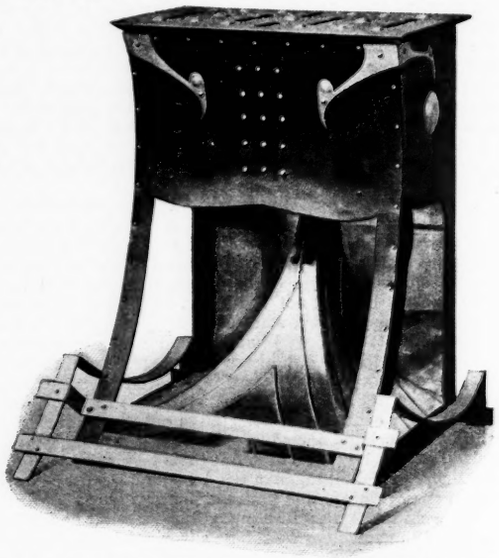


SURPRISE and regret have so often been expressed in the "JOURNAL" at the lamentable want of originality and artistic merit in the designs of gas-fires, as constructed by the majority of makers in this country, that there comes to us almost a sense of relief on hearing similar complaints uttered abroad. Our Dutch contemporary "Het Gas," in a recent issue, points out the fact, which has been so freely reiterated in these columns, that very little care seems to have been taken to make the outward forms of gas lamps, pendants, stoves, &c., conform to the reasonable claims of the artistic sense and good taste of users. Astounding conservatism and a woful adherence to precedent have, it says, prevailed in these matters.

The backward condition of the gas stove and fitting industries in this respect was brought into prominence at the Paris Exhibition of 1900, where were gathered together the products of the art trades of all civilized countries. It was pointed out in the course of the proceedings at the first International Gas Congress, which was held that year in the French capital, how badly the gas exhibits compared, from an artistic standpoint, with those in other sections of the Exhibition, and how essential it was that this state of things should be changed by the production of designs of gas-fittings, &c., which satisfied the higher artistic sense. This criticism was directed in particular to lighting appliances; but it might well have been extended to stoves and gas-heating apparatus generally.

Some effort, however, is at last being made in certain countries to improve matters; and we hope it may stimulate other manufacturers of gas-fires, &c., to study the requirements of people who have no aversion to warming their houses by gas, but will not do so until they can have something less repulsive to their artistic susceptibilities than the prevalent types of gas-fires. A Munich journal devoted to "Decorative Art" has lately given illustrations of three designs of gas-fires emanating from the works of Heer W. J. Stokvis, of Arnheim, and





they at least give some promise of a step having been taken in the right direction. The designs are in keeping with the materials employed, and are strikingly original and effective, as the accompanying illustrations show. Our Dutch contemporary expresses a hope that the Arnheim firm and other Dutch makers of gas-fires will persevere on the same lines, and worthily maintain the old artistic skill of the Netherlands, in applying it to this special branch of industry. Is it too much to hope that the example of the Dutch firm may prove an incentive to English manufacturers to produce some novel designs in gas-fires on artistic lines?

INHALATION OF OXYGEN AS A PREVENTIVE OF GAS POISONING.

The following is an abstract translation of an article on this subject, by Dr. L. Michaelis, of Berlin, in a recent number of the "Journal für Gasbeleuchtung."

Poisoning by carbonic oxide, or by gases containing it, is due to the strong affinity which it has for the oxyhæmoglobin of the blood, with which it forms the insoluble carbonic-oxide hæmoglobin. As the red particles of blood thus lose their property of transmitting oxygen, the action of carbonic oxide is characterized not by suffocation, but by direct poisoning. Hüfner has shown that the affinity of carbonic oxide for the hæmoglobin is 200 times as great as that of oxygen. Not only this affinity of carbonic oxide, but also the chemical proportions by mass, according to the Gouldberg-Waage theory, come into account in the regeneration of oxyhæmoglobin from carbonic-oxide hæmoglobin. Raising the amount of oxygen in the inhaled air from the 20 per cent. of atmospheric air to 100 per cent.—that is to say, inhaling pure oxygen—must have five times as great an effect, corresponding to the five times greater partial pressure of the oxygen. Experiments and researches by Haldane, Schwartau, and Dreser have completely confirmed this fact, and have afforded experimental authority for the inhalation of oxygen, which had often been employed before therapeutically, in cases of poisoning by carbonic oxide or illuminating gas.

The experiments were carried out in three ways.

1.—Two animals were poisoned to an equal degree with carbonic oxide. One was then placed in atmospheric air, the other in pure oxygen. The animal in the atmosphere of oxygen always recovered more quickly.

2.—Two animals inhaled equal quantities of carbonic oxide; but in one case air was added, and in the other pure oxygen. The animal which had oxygen lived; the other succumbed.

3.—A mixture of 1 per cent. carbonic oxide and 99 per cent. of air poisoned an animal. It fell, and remained lying down. On adding oxygen instead of air, the animal gradually recovered.

Cases have recently occurred where workmen at blast-furnaces, having been poisoned by carbonic oxide and given up by doctors as dead, have afterwards recovered on oxygen being administered. A striking case also was observed at Karwin, where six men cleaning a boiler were suffocated by poisonous gases, and there seemed no hope of rendering any aid, until the engineer of the works thought of two cylinders of oxygen which were in the laboratory. The oxygen was emptied into the boiler, with the result that the men began to breathe again, and were able to leave the boiler unaided through the manhole. In face of these facts, doctors are overcoming their objection to oxygen. Physiologists would not at one time admit that fresh, pure oxygen could exercise any reaction distinct from that of atmospheric oxygen. The works of Professor Zuntz and Löwy were quoted in support of this view, and yet quite recently these same professors have confessed to changed opinions.

With regard to the affections in which oxygen inhalation should be employed, two groups may be named in which undoubtedly success has been attained with this treatment. In cases of poisoning by carbonic oxide, the importance of oxygen inhalation is beyond question; also in poisoning by chimney gases, by mine

gases, in tunnels, &c., oxygen inhalations have been found to be effective. Brat has recently recommended it against methæmoglobin poisoning.

The value of oxygen inhalation having been established, it remained to construct apparatus for conveniently employing it. Two applications had to be distinguished—viz.: (1) The use of oxygen after the poisoning, in order to prevent the natural consequences; and (2) the employment of oxygen for preventing poisoning. The latter use is exemplified by the construction of apparatus permitting entry into a gasholder or an apartment filled with irrespirable gases. The apparatus for the first method of administration generally consists of a bottle or cylinder and a simple inhaler. A bag holding about 20 litres of oxygen is filled from the bottle, and workmen who have breathed illuminating gas, &c., inhale pure oxygen for about 5 minutes. A similar contrivance is in use at a number of blast-furnace works. The workmen like the oxygen, and often take it after exhausting work, where they formerly took a drink.

The construction of apparatus, which would make it possible to enter apartments filled with irrespirable gases was more difficult. There were two ways of proceeding—viz.: (1) By the use of air in its natural state; and (2) by using a small quantity of air in a compressed state. The first way consisted in the use of a covering for the head, similar to a diver's helmet, a long pipe, and a bellows. This apparatus has been improved by the introduction of a speaking tube leading to the open. The apparatus acts by such a large quantity of air being forced in by the bellows that the inflowing air prevents the entrance of irrespirable gases. It will be seen at once that this apparatus has a relatively limited scope. The workman is connected to the pipe, and can only work in the radius which this permits. Further, two persons are

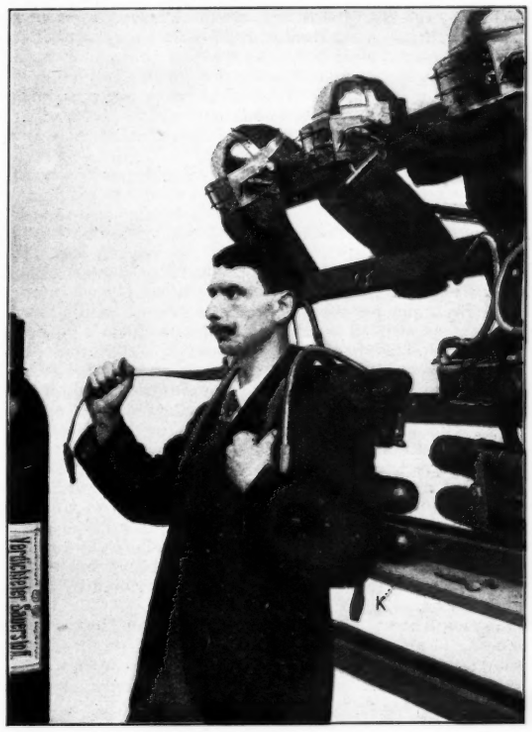
The Mayer-Neupert Apparatus.

always required when this apparatus is used, or three if there is a speaking tube; and the quantity of air supplied must be very accurately determined, so that it is not so little that irrespirable gases can enter, and not so much that breathing is rendered at all difficult.

The type of apparatus in which compressed air is supplied aims at an entirely different object. The endeavour is to make the workman quite independent of his surroundings, and allow him to perform any kind of work, just as if the poisonous gases were not there. There are three forms of this type of apparatus —two dating from the end of the last century, and one from last year. They are: (1) The "Pneumatophor," constructed by Herr Ritter von Walcher and Professors Gärtner and Benda; (2) the Mayer-Neupert apparatus; and (3) the Giersberg apparatus, on the Berlin Fire Brigade model.

The difference between these three forms of apparatus will be best seen by considering the conditions which they are required to fulfil. The first requirement is that the apparatus must be ready for use at any moment. This was not the case with the "Pneumatophor," because immediately before use the bottle had to be tested by actual filling. The bottle had then to be fixed in the apparatus, and the slit of the apparatus again made tight by iron bands. In a second type of the "Pneumatophor" soda lye had to be poured into the bag through a small funnel from a closed bottle. The soda lye had then to soak through a loofah net, so as to give an enlarged surface. Then the bottles had to be tested separately with a pressure-gauge; and when this was done, it was not certain that the contents of the second bottle were not slowly escaping while the first was being used.

The conditions were very similar with the Mayer-Neupert apparatus. The caustic potash had to be taken from a closed tin box, in order to be placed in the shoulder collar of the apparatus, which had then to be closed by bands. The manipulation of the the bottle was the same as with the "Pneumatophor." All had to be done at a time of need and danger; and it would be quite likely that the manipulation would not be carried out with the necessary care. In the Giersberg apparatus, all this manipula-



The Giersberg Apparatus.

tion is done away with. Both bottles are provided with a high-pressure gauge, which gives a correct indication of their charge, and at the same time constitutes a test for the soundness of the apparatus. The regenerator containing the material which will absorb the carbonic acid, forms part of the apparatus itself, and the material is protected from exhaustion by two valves. Therefore, to bring this material into action, no pouring in from (or breaking) a vessel is necessary; the two valves are opened, and the apparatus is ready for use.

The second condition in a life-saving apparatus is that it should have no fragile parts, nor any materials affected by air. In this respect, the large quantities of india-rubber used in the Pneumatophor and the Mayer-Neupert apparatus are objectionable. In the new apparatus, however, except for a pipe about 2 inches long, only metal is employed—even the shoulder pipes being of flexible metal.

The third condition is that the apparatus must be capable of being used in any position. It is evident that the caustic alkali used in the "Pneumatophor" requires great care, as by tilting the bag the lye might get spilt and cause serious injury. The same thing obtains for the most part in the Mayer-Neupert apparatus. In this respect, also, the Giersberg apparatus, 1901 pattern, fulfils the requirements, as it leaves the chest perfectly free, and only covers the back; while it employs a dry absorbing medium. It is possible to use it in any position.

The fourth condition is that the apparatus should not interfere with the activity of the person using it. In regard to this condition, with the Giersberg apparatus, Meyers found that the employment of an injector, and the continuous supply and extraction of the oxygen thereby secured, were theoretically ideal. Every one who has seen the other types of apparatus in use knows how troublesome it is for the workman to have to interrupt his work about every 1¼ minutes to refill the bag. In the Mayer-Neupert apparatus, there is also the continual wiping of the sight-holes. If, for example, two men provided with these forms of apparatus are carrying a comrade on a stretcher, they must put it down continually in order to refill the bags with oxygen. As the consumption is not the same with all individuals, this refilling would take place at different intervals, and thus double time might very possibly be lost.

The fifth condition is that provision must be made for purifying the products of exhalation. Naturally, the products of breathing, as soon as they leave the lungs, should have the largest space possible, so as to avoid any resistance to the lung. This hint of Nature's has not been followed in those types of apparatus in which the exhalation products have to be drawn through long thin pipes into a closed bag, which is also full; so that the pressure of its contents offers resistance to the person exhaling. Moreover, the absorption should always be arranged so that it takes place by the passage of the products over a regenerating medium. In the "Pneumatophor," the soda lye being underneath, on inhaling, those particles of air first pass into the lungs which have just been exhaled, and still remain in the upper part of the bag. Every one working with the "Pneumatophor" has, after a certain time, to shake the bag, and thus, by sprinkling the soda lye about, obtain a larger surface and a better absorption. Very similar conditions apply to the Mayer-Neupert apparatus, as is shown by the fact that an alteration in the method of regeneration is being projected. In the Giersberg apparatus, by utilization of the mechanical power of the oxygen, it becomes possible in a closed space to imitate Nature to a certain extent; for the products of exhalation are drawn away from the person.

The sixth condition is that a life-saving apparatus must act quite independently of the person using it, and in particular the dose of oxygen should not be controlled by the workmen. Any one who has worked with the earlier forms of apparatus knows how troublesome it was to have to fill the oxygen bag. If two much oxygen was admitted, the pressure prevented either inhaling or exhaling; and if too little, the supply was not sufficient for breathing purposes. Attempts to work with a reducing-valve have not proved successful, as the products of exhalation have to be removed, or else there would be a continual increase in the quantity supplied.

Exhaustive experiments by Professor Zuntz have shown that a man requires somewhere between 250 and 2500 c.c. of oxygen per minute. The first figure is the quantity required when at rest, and the second the maximum ever attained after great expenditure of power. In the new apparatus, 2000 c.c. of oxygen are supplied per minute so as to replace the quantity withdrawn as carbonic acid by the absorption medium, and also to maintain the necessary circulation of the inhaled and exhaled air. The oxygen being continuously supplied, the workman knows that up to the last minute he will have enough oxygen for breathing purposes. Thus any feeling of insecurity is obviated by the use of this apparatus.

The seventh condition is that the apparatus must be easy to clean after use. The absorption media formerly used required thorough cleaning of the apparatus by rinsing for hours with water. By using a dry medium, such as soda lime, it is only necessary to open the lid and empty out the dry material.

In comparing the systems, it has not been mentioned that, with the Giersberg apparatus, the oxygen is supplied to the mouth with certainty, and the products of breathing are sucked away. The apparatus admits of a helmet being used. The helmet allows breathing through the mouth and nose, as well as speaking. With the Giersberg helmet, which is closed by india-rubber, it is possible to get so tight a joint that men have been for an hour in the thickest sulphur vapour without knowing in what medium they were. It seems likely that, by the use of this apparatus, work will become possible which at present can be carried out either only with endless labour, or not at all.

Its application in the gas industry will have been obvious from the foregoing. In every gas-works there should certainly be a bottle of oxygen and an inhaler; and the workmen who are frequently inhaling gas should be obliged to take some oxygen once or twice a day. In a very short time no supervision in this direction would be necessary, as the workmen would willingly inhale it of their own accord. There should also be a breathing apparatus, to make it possible to penetrate into poisonous interiors without loss of time, and without danger.

NOTES.

Manufacture of Gas from Waste Liquors.

The subject of the manufacture of gas from the waste liquors from cellulose factories was dealt with at some length a short time ago in "Papier-Zeitung." According to an abstract contained in the "Journal of the Society of Chemical Industry," instead of burning off the organic matter in the recovery of soda from alkali sulphide cellulose liquors, the author (Dr. E. R. Besemfelder, of Charlottenburg) prepares from it a gas for heating or mechanical purposes—incidentally recovering the whole of the sulphur—by a continuous system of treatment. The principle consists in carbonizing the concentrated liquors by means of hot gases, collecting and purifying the volatile gases, and generating at the same time a combustible gas by blowing steam over the coke so produced. Dr. Besemfelder uses the apparatus which was described in the "JOURNAL" early in the year (see Vol. LXXIX., pp. 207, 276).

Action of Distilled Water upon Lead.

Dr. Frank Clowes, the Chief Chemist and Superintending Gas Examiner to the London County Council, has been investigating the above subject; and he communicated the results to the members of the British Association at their recent meeting in Belfast. As the outcome of his experiments, he came to the conclusion that dissolved oxygen is the cause of the action of distilled water upon lead; the subsequent action of carbonic acid leading to the production of hydroxycarbonate. As it has been suggested that the action of water upon lead is indirectly due to the presence of bacteria, Dr. Clowes, in the course of his experiments, frequently exposed water sterilized by long boiling to lead which had been fused in a flask sterilized by steam in the presence of air which had passed through cotton wool. The oxidizing action occurred freely in all such experiments, presumably in the absence of bacteria and their products. The action of distilled water, or of soft waters generally, upon lead may be considerably reduced by dissolving various substances in the water. Sulphuric acid, or a sulphate, was found to be most efficient for this purpose; carbonic acid and carbonates proved less so; and lime water still less—in fact, it even promoted the action when it was used in larger proportion.

The Korting Gas-Engine at Dusseldorf.

Among the prime movers shown at the Düsseldorf Exhibition, was a 500-horse power double-acting Körting gas-engine and blowing cylinder. The purpose for which the engine was arranged was for supplying the air blast for smelting iron. The engine is of the type which takes a charge at each end of the motor cylinder, the piston being in the middle; and there is a scavenging arrangement. There is an impulse at every stroke, on one side of the piston; so that the motor resembles a steam-engine in this respect. The valves are positively driven by means of a cam action. The working cylinder of this engine is 635 millimetres (26·87 inches) diameter, with a stroke of 1100 millimetres (43·31 inches). Blast-furnace gas is intended to be used as the source of power, and the initial compression of the charge is high—about 120 lbs. per square inch. The pressure on firing may attain over 400 lbs. per square inch, and the mean pressure throughout the stroke is usually about 90 lbs. per square inch. The ignition is electric, as is usual with this class of gas-motor. The engine occupies a good deal of room, as it is of the horizontal type commonly favoured by Continental engineers; and the air-compressing cylinder is in a straight line with the main piston. The Siegener Company are makers of the engine, which has been illustrated in "Engineering."

A Question of the Nature of Carbonic Acid.

Writing in "Nature," Professor R. Meldola raises a question respecting the nature of carbonic acid gas—which it is safe to say would not have been asked by a scientific person before Lord Rayleigh's impeachment of the simplicity of nitrogen. The question asked is whether the carbonic acid which is exhaled as a product of animal or vegetable vital processes differs in any way from that formed inorganically, as by the combustion of carbon in oxygen. Professor Meldola admits that he has hardly dared to give expression to the idea underlying his inquiry, and he quite expects that the answer to his question will be in the negative, since on theoretical grounds "an asymmetric structure is not possible in the case of this molecule." Nevertheless, he thinks it might be worth while to cross-examine Nature on the point; from which it is fairly deducible that he has, or thinks there may exist, some justification for the suspicion that we do not yet know all about carbonic acid. One way of making an experimental test

would be to collect samples of inorganic and organic carbonic acid, and try their rates of absorption by a growing plant. Another way would require the use of some optically active compound sufficiently basic to absorb carbonic acid. Professor Meldola says he does not know of any such compound for the moment, and asks for information. Given such a base, would it absorb gas from the two sources indicated as inorganic and organic at equal rates? Not the least curious aspect of the question is that it should be left to be asked at the present day.

The Prohibition of Saccharin.

A striking commentary on the extravagant expectations that were at one time formed in regard to the commercial possibilities of the wonderful coal-tar product commonly called "saccharin" is furnished by the intelligence that its production, importation, and sale in Germany for other than medicinal or scientific purposes were forbidden by a law just officially promulgated. The law itself, however, came into force so long ago as April 1 last. There is a similar law in Italy, passed this year. The dietetic use of saccharin has been forbidden in France for some time. This use and the traffic in the drug are not absolutely forbidden in the United Kingdom; but a Customs Order has been issued notifying that henceforward the full duty of 1s. 3d. an ounce will be charged on all importations of saccharin, and mixtures containing it or any other substance of like nature and use. This requirement will effectually kill the use of saccharin for any dietetic purpose. The reason of this governmental discouragement of what was regarded as a triumph of synthetic chemistry and an addition to the resources of civilization has not been published; but it probably rests upon the well-understood fact that saccharin is not digestible in the smallest quantity. This being the case, as it is not a food, it cannot have any good effect upon the animal organism; and it had therefore better be kept out of the human economy. Those who thought at one time that the discovery of saccharin was likely to react beneficially upon the coal-gas industry, by bringing tar more into demand, will therefore be disappointed.

Ransomes and Rapier's New Coal-Loading Crane.

An interesting novelty in the shape of a crane constructed to load coal and coke into ships with the smallest possible breakage of the pieces, has been built by Messrs. Ransomes and Rapier, Limited, of Ipswich, for the Wallsend and Hebburn Colliery Company, at this Company's staithe on the Tyne. The coal is run up to these staithes in steel tubs holding 5 tons, which rest upon underframes running on rails from the pit head. When the trucks arrive within reach of the crane, the tubs are lifted off them by chains passing over toothed trunnions at the ends. Having raised the tub, the crane lowers it into the ship's hatchway, where, by pulling on one side of the sling and slacking off on the other, the tub is tipped as closely as possible to the ship's bottom. Thus the contents suffer but little of the usual smashing and grinding of a "tip," having only a short distance to fall. The empty tub is finally hoisted up and replaced on its carriage, to be despatched over the "empties" side of the rail connection. The chief feature of the plant is that the power required for doing the work is supplied by the excess of force developed by the descent of the full tub over what is absorbed by the ascent of the empty one. This is effected by causing the descending tub to force water into an hydraulic accumulator, from which water is afterwards drawn to effect the other manipulations necessary to the operation of the staithe. The crane can be shifted laterally, and the jib derricked, so that any ship's hatchway can be readily plumbed, and the attendance of only one man is required to ship material at the rate of 40 to 45 tubs per hour. It would seem that the prospects of a large extension of this system are bright. The arrangement strikes one as clever and well adapted to the purpose to be served.

Drying Quality of Oils.

The true cause of the drying of certain oils which are employed as siccatives for painting purposes is not easily ascertained and expressed in precise terms. Lippert, who has made a study of the subject, remarks that the drying property of the fatty oils is commonly admitted to be a function of the atmospheric oxygen which they absorb. It must be atmospheric oxygen, which is another peculiar fact; for the oxygen of water does not act in this way upon oils. One teacher has laid it down that the more siccative an oil is, the more rapidly it absorbs the oxygen of the air, and the more its weight increases in a definite period of time. It would appear to follow, therefore, that this increase of weight might be the measure of the siccative power of the oil; but it is not really so. An experiment intended to determine the quantities of oxygen absorbed from the atmosphere by various oils is easy to arrange, Samples of different fatty oils may be exposed (in capsules) to the air for a definite period of time, and the increase of weight noted at the end; but the disconcerting fact will appear that all such oils, whether drying or not, increase in weight by the absorption of oxygen. Lippert tried the effect of exposing different oils in the state of the thinnest possible films which it was in his power to spread on tin-plates; and he found that even in December the absorption of atmospheric oxygen in the course of the first eighteen hours was considerable. His experiments showed that linseed oil gradually increased in weight during the first three days; markedly so on the fourth day; and at the end of seven days the coating was dry. After this stage, the action apparently becomes very much slower. If it stopped entirely, one would suppose there would be no further alteration of the condition of the film of oil, which, unfortunately, is not the case. The desiccation of an oil, meaning its attainment of its maximum weight, can, within limits, be hastened by the addition of a siccative. The drying power of an oil cannot be increased to infinity by the addition of a drier; but if this is overdone, the film begins more rapidly to lose its weight again. Manganese resinate, for instance, which is a powerful siccative, makes linseed oil viscid in a month if present in the high proportion of 5 per cent. The same effect is produced by excess of lead oxide. It might be possible to detect adulteration of oil or excess of siccative addition by weighing for the maximum increase of weight by oxygen absorption; but the difficulty is to hit upon the precise time when the weight is at the maximum, which may be a question of hours. After all, the test by the feel of viscidity in a film at the end of a month seems to be as good as any.

Hennebique System of Ferro-Concrete Construction.—At the meeting of the Society of Engineers on Monday evening last week, a paper was read on "The Hennebique System of Ferro-Concrete Construction," by Mr. Augustus de Rohan Galbraith. The Hennebique principle consists in embedding in concrete straight and cranked iron or steel tension bars and stirrups, to take the shearing stresses, together with distance-pieces; the system being applicable to entire buildings from foundation to roof inclusive. It may be remembered that the piles used in the new dock works at Southampton are built up in vertical moulds, in which are placed long steel rods, which give the required strength. These are laced together with wire stirrups, and portland cement concrete of the best quality is filled into the moulds and rammed round the steel. After a month the pile is taken out of its mould and driven in position, much in the same way as are timber piles. On the occasion of the visit of the Society to Southampton in July, of which an account appeared in the "JOURNAL" at the time (*ante*, p. 214), great interest was manifested in the process of driving these piles.

A Burning Gas Well in Canada.—According to "Petroleum," Mr. O. W. Chamberlin has lately completed a journey north of Calgary, lying above the primeval wilderness, in Canada. His party reached a territory on the Athabasca River where the Ottawa Government have spent a good deal of money in trying to locate oil. For upwards of a hundred miles along this river, they found several indications of petroleum with gum beds and tar sands, where the crude oil had been exposed to the sun and evaporated. At Pelician Rapids, the party examined the site of the Ottawa Government's last drilling for oil. Here a big gas well had been struck and abandoned. Several miles away the exploration party could hear the roaring of gas; and as they approached, they found a huge gas well on fire, emitting enormous volumes of gas, the noise of whose fury was plainly heard for miles around. Mr. Chamberlin is confident that both oil and gas exist in very large quantities in the neighbourhood, and that, when transportation facilities are extended, one of the largest oil territories on the continent will be developed. He gathered a sample of the oil from the surface of the river; and an analysis shows a very fine quality of petroleum with a paraffin base. At present the burning gas well is simply a resort for the uncivilized Indian tribes; while the oil resources are awaiting the drill, and the energy of civilization, to develop their untold possibilities, and turn them to active industrial use.

Briquette Making in Germany.—According to a recent report by the United States Consul-General in Berlin, the briquette-making industry in Germany (which is a comparatively new one) is controlled by a Syndicate which includes 31 firms and companies, producing more than nine-tenths of all the briquettes in the country, and also regulating the output and prices. Of the 1,643,416 tons made during last year, 1,566,385 tons were the production of the Syndicate. They sold 749,208 tons to the railways 124,380 tons to retailers, 497,136 tons to factories and workshops, while 149,089 tons were used by German merchant steamers and the Navy or exported to the neighbouring countries or to colonies. The Syndicate produce briquettes made, for the most part, from coal screenings, which require a matrix or binder of some plastic, inflammable material, and for this purpose nearly 120,000 tons of mineral pitch were used, at a cost of about £2 2s. per ton. Some interesting information is furnished as to the effect of the use of these briquettes upon the smoke nuisance, which has everywhere become so persistent and oppressive. As the result of this, the opinion is expressed that Berlin ranks as one of the cleanest and best-kept cities in the world. The writer says that the reason for this lies in three facts: (1) The general use of coke and briquettes, which are practically smokeless; (2) the skilful, scientific construction of boiler furnaces and chimneys; (3) the high standard of skill that is taught and enforced among firemen who are employed to stoke furnaces with coal for steam and manufacturing purposes.

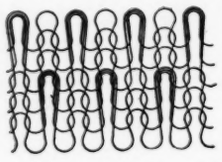
REGISTER OF PATENTS.

Regulating the Supply of Gas to Burners.—Hooker, W., of Woodside, Surrey. No. 12,432; June 18, 1901.

In the "JOURNAL" for June 11, 1901, a modification was described of the "platinum thimble" burner patented by the present inventor and D. Murray in 1888. In the burner referred to, a mixture of gas and hydrocarbon vapour and air was proposed to be used; and the object of the present invention is to provide means whereby the quantity of mixture produced will be dependent on the number of burners in operation, while the strength of the mixture is unchanged. The description and illustrations disclose that the proposal is to combine with an air chamber (to which air is supplied under pressure) an expansible chamber, a pipe connecting the air and expansible chambers, a cock or valve for controlling the flow of fluid from the air chamber, and a carburettor connected with the supply-pipe, so as to permit the regulation of the quantity and quality of the mixture. The apparatus may, with modifications, be used in connection with coal gas.

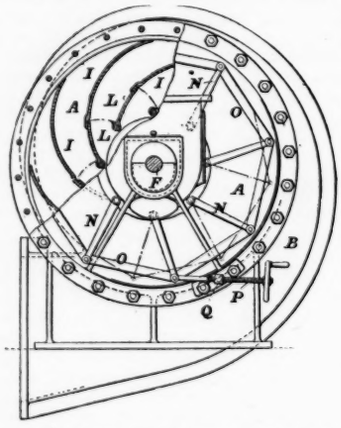
Knitting Incandescent Gas-Mantles.—Koblenzer, M., of Vienna. No. 21,615; Oct. 28, 1901.

This invention refers to the mantle made famous by the late Directors of the Welsbach Board, who had great expectancy of its being the best article of the kind ever put upon the market. It was alluded to at the meetings of the Company, under the name of the Koblenzer mantle. As a matter of fact, the invention only refers to the knitting of the fabric forming the base of the mantle; and the specification now published describes the machine. It will not interest readers to enter into details; but it may be mentioned that, in so far as the principle of its construction is concerned, the machine is an ordinary English circular knitting machine—the main feature of the improvement being that the needles are subdivided into series of sets of needles of unequal length. For the needles of each such set of series, there is provided a special guide groove, wherein that part by which the needles are raised in order to cause the loops as they form to pass over the needle tongues down on the shank, are periodically made flat or shallow; so that the needles which happen to be under the influence of this shallow shape of their guide groove do indeed form a fresh loop at each revolution of the machine, but do not throw off such loops simultaneously until after the guide groove has resumed its normal position. The mantles made by means of these machines—owing to the fact that some of the stitches (alternately, or periodically) overlap one or more rows of stitches—"turn out much stronger and of a firmer texture than any of the mantles now generally found in the market." The illustration shows a piece of the fabric produced by the machine; and it will thus be seen that, with this mesh, mantles, if fractured, would be likely to split circularly and not vertically.



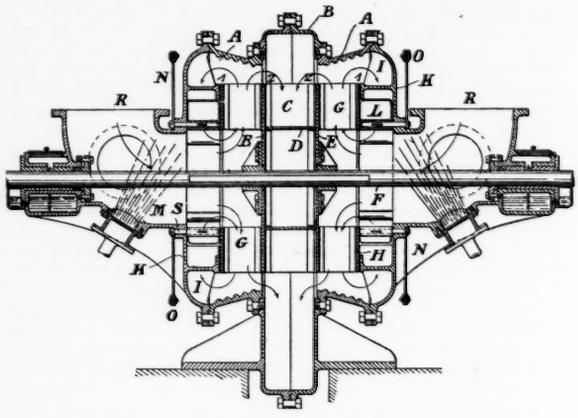
Centrifugal Apparatus for Purifying Gases.—Humphrey, H. A., of Winnington, Northwich. No. 22,131; Nov. 2, 1901.

Briefly stated, this invention relates to centrifugal apparatus for purifying gases, by the improvements in which the gas and water are brought into repeated or prolonged contact, and the gas may be delivered either under increased pressure or not. The patentee constructs the centrifugal apparatus, such as a centrifugal fan, with a casing divided into two chambers, one of which contains the fan, while the other serves as a bye-pass for the gas between the periphery and the intake of the fan-chamber; and when it is desirable that the gas should not be delivered under pressure, he constructs a turbine on the shaft carrying the fan, so that the gas must pass through this turbine as it is delivered from the apparatus. Thus the pressure of the gas becomes converted into motion by the turbine, which may assist the motive power driving the fan. To effect a systematic purification of the gas, it is passed through a series of centrifugal fans, each delivering into the next; the water flowing through the series in a direction opposite to that of the gas.



In the drawings, fig. 1 is an end elevation, partly in section, of an apparatus consisting of a central centrifugal fan with a centrifugal fan on either side of it, each of these two fans having a bye-pass chamber; and fig. 2 a longitudinal vertical section.

The two casings A are fastened, one on each side, to a third casing B, which has the usual snail shape of a centrifugal fan casing and contains fan-blades C mounted on a drum D, which is fastened to discs E, themselves mounted on the shaft F. The other face of the disc E carries fan-blades G, to which is attached an annular disc H. The latter serves to divide the chamber formed by the casing A into two chambers, the outer of which contains a number of curved guide-blades, each made in two parts, as shown in fig. 1. The part I, far from the axis of the casing, is cast in one with the end cover K of the casing; while the part L near the axis is keyed to an axle M, which extends through the end cover of the casing. These guide-blades form passages for gas from the periphery to the centre of the fan; and in order to control the quantity of gas which can pass through the passages, each of the lower parts of the blades may be turned down on to the one next to it. For this purpose, the axles M have keyed to them lever arms N, which are pivoted at their other ends to a frame O. By shifting this frame by means of the screw P working in the nut Q,



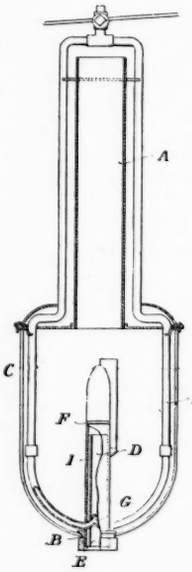
the blades L are more or less turned. The interior surface of the casing A is coned outwardly towards the chamber thus partitioned, and is corrugated on its interior surface

The operation of this apparatus is as follows: The gas to be purified enters at R, and passes through the water-sprays into the fan, where it is thrown, together with the water, at high tangential velocity against the interior of the casing. This being coned, much of both gas and water are caused to travel back in the direction of arrow 1, whereupon they are caught by the guide-blades I, and returned to the entrance of the fan. Some of the gas, however, is always passing forward, as indicated by arrow 2, into the central fan chamber, to be delivered in the usual manner. The proportion of the gas which thus circulates through the fan and the partitioned chamber is controlled by adjusting the position of the moveable blades L. The corrugations on the interior coned surface of the casing A serve to retain water, so that there is always a layer of water against which the gas is projected. As a substitute for the corrugations, an annulus may be bolted between the casings A and B, so as to project into the passage between them, and thus form a weir over which the water running down the interior surface of A must flow.

Other forms of the apparatus are described and illustrated.

Intensifying the Light in Incandescent Lamps.—Koch, R., and Rothenberg, L., of Berlin. No. 12,278; May 29, 1902.

For the production of intense light in incandescent gas-lamps, elevated draught cylinders, together with suitable mixing-tubes, are employed, the object of which is to draw the combustion gases of the incandescent gas-burner upwards, and to draw in an excess of air. The process for obtaining a suitable gaseous air mixture of one part gas to five parts air with the help of a mixing-pipe is well known. In the production of the gaseous air mixture, it is requisite to obtain an intimate mixture of gas and air, which must have a slight, but scarcely perceptible, pressure when it arrives at the burner, and must be driven at a sufficiently great speed through the incandescent body. In these lamps, the air is introduced through the openings of the nozzle-pipe over the nozzle. In practical use, the patentees say, "such lamps have shown defects, especially because the air introduced, which is afterwards carried upwards with the gas within the mixing tube, is caused to swing or vibrate unpleasantly by the lateral introduction, so that, for the production of intense lighting powers, an incomplete gaseous mixture is produced." Attempts to remove these "evils" as much as possible have led to the recognition that a better effect and a higher utilization are obtained if the air, instead of being introduced to the mixing-pipe laterally, is introduced from below, and, indeed, underneath the gas nozzle; so that the air before, and while mixing with the gas, is within a closed chamber.

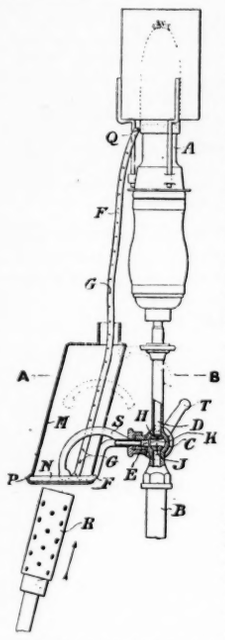


In the patentees' process, the mixing-pipe is arranged in a chamber completely shut off from the outside atmosphere, so that the gaseous air mixture in the mixing-pipe is not so much exposed as hitherto to the variations in temperature of the outside atmosphere. The illustration represents one mode of carrying out the invention. The draught-pipe A is connected air-tight at B, through the lamp globe C, with the mixing-pipe D E, so that the outside air cannot enter the globe except through the desired orifices. The mixing-pipe carries the burner-head F with the incandescent body or mantle. The nozzle G on the gas supply-pipe H is arranged within the mixing-pipe. The under part of the mixing-pipe

extends below far beyond the nozzle. In order to cause a suitable cooling of the mixing-pipe, this is surrounded by a pipe I, which is provided with openings underneath at the air-inlet, so that air can flow in to the channel formed between the pipes I and D E and unite under the burner-head with the gaseous air mixture.

Lighting Gas-Burners.—Schwab, M., and H. Greene and Sons, Limited, of 36, Mark Lane, E.C. No. 17,c06; July 31, 1902.

In the apparatus proposed by the patentees for lighting incandescent and other gas-burners, a cock is adapted to be opened and closed to admit and shut off the supply of gas. On the cock being turned from the closed to the open position, it opens for a short period, and then closes a way or bye-pass for the passage of gas to a perforated pipe or climbing light disposed and adapted to receive a small supply of gas, which, when lighted, climbs and lights the burner. One form of the apparatus is shown in the drawing. A is a gas-burner mounted on a pipe B leading from the gas-main. C is a cock having a passage D leading to the burner and another E leading to a climbing light or perforated pipe F. This pipe is provided with perforations G. The plug H of the cock is furnished with a passage J, having flared or trumpet-mouthed ends K so disposed that, when the spindle is in an intermediate position between the closed and opened positions, there is a channel for the gas from the main to the burner through the passages J and D, and to the perforated pipe F through the passages J and E; but it is so arranged that the supply of gas is cut off to the passage E when the passage D is fully opened or closed.



The perforated pipe is preferably disposed in an open-ended chamber M, in which it is coiled as at N. The chamber is provided with a recessed part or tip P, for protecting the perforated pipe. This pipe passes out through the chamber M, and extends to Q, at or near the jet or mantle. R is the top of an ordinary lamplighter's torch in which a naked light is provided. S T is a handle or two-armed lever attached to the plug H for operating it. One arm S is adapted to be just at the mouth of the chamber M when the cock is closed.

In operation, assuming the cock is closed, and that it is desired to light the lamp, a torch is passed up into the hollow of the chamber M, when it comes in contact with, and raises, the arm S, turning the cock into the first position, and then into the "on" position. Gas is simultaneously supplied to the burner, and for a short period of time to the perforated pipe. The gas, coming in contact with the torch flame, is ignited as it issues from any one of the holes just at, or near the bottom end of the perforated pipe, and then at the other holes one by one further up the pipe until the light reaches the top, when it ignites the gas issuing from the burner. The shape and form of the passages in the cock can be so adjusted as to regulate the supply to the climbing light to ensure the burner being lighted without explosion or violence. The chamber M serves to guide the torch and protect the light from wind blasts before ignition.

Treating Spent Gases Resulting from the Manufacture of Sulphate of Ammonia for the Recovery of the Cyanogen Group.—Godwin, A. H., and Keil, F. A., of Margate. No. 2456; Jan. 30, 1902.

The object of this invention is to treat the spent gases given off in the saturator in the process of manufacturing sulphate of ammonia from ammoniacal liquor for the recovery of the cyanogen group contained therein. The spent gases from the saturator are passed through a solution of suitable iron salt—such as sulphate or chloride of iron—containing a percentage of sodium or potassium hydrate or carbonate; and in this manner, ferrocyanide of sodium or potassium is formed, according to the alkali employed, which may be crystallized out in the ordinary way; or prussian blue may be formed and precipitated by passing into the resulting solution, perchloride or persulphate of iron, and in practice about a 10 per cent. solution may be employed. But this may be varied to a very great extent without affecting the result; while, in a solution containing (say) 125 parts of the chemicals, 50 may be of the iron salt and 75 of the alkali. These proportions, however, may be varied; but sufficient alkali is always employed to convert the particular iron salt used into carbonate of iron, and to give the solution an alkaline reaction. In this process, where sulphur or sulphur compounds are formed, with the ferrocyanides, and are contained in the solution as an impurity, they may be separated by adding bisulphide of carbon, and be removed by filtration before crystallizing out the ferrocyanides, or forming prussian blue.

Increasing the Power of Gas-Engines.—Taylor, M., of Paris. No. 13,273; June 11, 1902.

The design of the patentee is to provide means for increasing the power of gas-engines working with poor gas. "Being given," he remarks, "a gas-engine fed by a gas of a determined calorific power, the power of the motor will be the greater according as the pressure of gas is higher, since the quantity which enters the cylinder increases with the pressure possessed by the gas. This is specially true for motive-power installations comprising a gas-producer supplying an engine working with poor or low-grade gas, in which neither a gas-holder, a pump, nor a ventilator is employed, but the gas-producer acts by the simple suction of the motor piston." Under these circumstances, the patentee proposes an apparatus which permits, without requiring any supplementary effort on the part of the motor, low-grade gas to enter the cylinder at a pressure approximately equal to that of the atmosphere, and appreciably higher than that which at present it is considered in practice cannot be passed. The invention consists in replacing the bell from which the suction takes place at present, and of which the volume is constant, as its walls are rigid, by a chamber of which one wall at least is elastic or moveable, in order that the capacity of this chamber may be capable of variation. This chamber is arranged as near as possible to the motor, in such a manner that, during each of the suction strokes of the motor piston, the pressure of the atmosphere will set up an amount of contraction, and that, during the three other strokes of the piston, for completing the cycle, a suitable spring restores the chamber to its normal volume. The illustrations accompanying the specification show various methods of accomplishing the proposals, by which (the patentee states in setting forth the advantages secured) "the output of the motor is found to be increased in a proportion that experiments have shown to be about 20 per cent. The same motor which gave 20-horse power with town gas, and only gave 17 to 18 horse power with poor gas, gave with this arrangement 22 to 23 horse power with the same quality of poor gas."

APPLICATIONS FOR LETTERS PATENT.

20,629.—O'Brien, M. B., "A composition for improving the illuminating power and destroying the smoke and smell of burning oils or gas." Sept. 22.

20,718.—Johnson, C. J., "Gas machines." Sept. 23.

20,760.—Edwards, E., "Gas or oil engines." Sept. 23.

20,761.—Stoess, L., "Chimneys for incandescent gas-burners." Sept. 23.

20,810.—Groves, A. W., "Acetylene gas generator." Sept. 24.

20,826.—M'Nally, J., "Purifying acetylene gas." Sept. 24.

20,862.—Gray, W. E., "Burners for gas-stoves." Sept. 24.

21,893.—Maccallum, P. F., "Producing high pressure combustion gases, and apparatus therefor." Sept. 25.

20,895.—Anderson, A., "Acetylene gas generators." Sept. 25.

20,907.—Daw, A. W. & Z. W., "Turbines actuated by steam, air, or gas." Sept. 25.

20,972.—Gell, J., "Regenerative incandescent burners." Sept. 26.

20,984.—Little, G. & A., "Coke conveyors." Sept. 26.

21,012.—Haddan, H. J., "Incandescent gas-burners." A communication from S. N. Wolff and Co. Sept. 26.

21,014.—Dougall, J., and Godwin, A. H., "Manufacture of gas." Sept. 26.

21,035.—Long, E., "Prepayment meters." Sept. 27.

21,036.—Mason, J., and Nuttall, S., "Burners for gas cooking-stoves" Sept. 27.

21,054.—Bartlett, J., "Acetylene gas generators." Sept. 27.

21,132-3.—Doman, W., and Streeten, B. S., "Acetylene generating apparatus." Sept. 29.

21,134.—Lauder, G. M., "Burners for acetylene and other gas." Sept. 29.

21,168.—Pollard, J. L. A., "Improved heating stove." Sept. 29.

21,182.—Marshall, C., "Anti-vibrator for incandescent gas-burners." Sept. 29.

21,227.—Graham, W., "Heating the fixed ovens of domestic fireplaces by gas." Sept. 30.

21,240.—Howorth, F. W., "Incandescent gas-burners." A communication from the Beleuchtungs-Industrie Paul Flor. Sept. 30.

21,266.—Clark, T. E., "Acetylene gas generators." Sept. 30.

21,274.—Adam, W. W. & M. A., "Incandescent mantles and burners." Sept. 30.

21,311.—Malpass, E. W., "Incandescent gas-light regulator." Oct. 1.

21,312.—Threlfall, R., "Anemometric gas and liquid meters." Oct. 1.

21,368.—Wood, C., "Internal combustion engines." Oct. 1.

21,370.—Pick, W. H., "Suspending lamps." Oct. 1.

21,389.—Haddan, H. J., "Igniting gas-lamps." A communication from the Compagnie Belge pour la Fabrication des Compteurs et Matériel Gaz, Eau, Electricité. Oct. 1.

21,428.—Bell, L., "Gas-brackets." Oct. 2.

21,443.—Little, A., "Chains for conveyors and elevators." Oct. 2.

21,585.—Reynolds, W. H., "Fluid meters." Oct. 3.

21,586.—Backeljau, F. F. C. M., "Purifying smoke and gas." Oct. 3.

21,654.—Imbert, G., "Heating and lighting apparatus." Oct. 4.

21,663.—Temperley, J. R. & J., "Storage of coal." Oct. 4.

The Lighting of Devonport.—Complaint was made at the meeting of the Devonport Town Council on Thursday of the inadequate lighting of the streets. Alderman Goodman thought it had been worse instead of better since the Corporation acquired the gas-works, and he strongly urged the Council to pass a resolution in favour of incandescent lighting throughout the town. Alderman Bryant supported the recommendation, and said that in some of the streets leading to the waterside the lighting was so bad as really to be dangerous. Mr. W. H. Roberts pointed out that in Keyham Barton, a newly developed portion of the borough, there was no light at all. Alderman May gave notice to move at the next meeting that it be an instruction to the Gas Committee to provide incandescent lighting throughout the town in place of the existing burners. The Mayor (Mr. E. M. Leest) said the subject was already under the consideration of the Surveyor's Committee, who had charge of the public lighting. Most of the lanterns in use were unsuitable for incandescent burners and mantles. The Committee had obtained one sample lantern and fixed it; and they intended to get others and test them with a view to deciding which was most suitable. Any new lanterns purchased could be utilized for incandescent burners.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

The Slot System Discussion at the Midland Meeting.

SIR,—If I have any regret, it is that the reading of my paper did not provoke its discussion. Perhaps there is yet time to affect the huge majority on the other side. True it is, that certain gentlemen said they were satisfied that the slot business paid; and particularly well in each individual speaker's case. But such observations had nothing to do with the paper. In the paper, an attempt was made to compare the ordinary and slot consumers as profit providers, and to find on certain assumed lines: (*a*) A paying average consumption; (*b*) a fair extra charge to slot consumers; and (*c*) to show that the supplying of a few fittings at a perpetual annual hire charge to the best slot consumers of from 25s. to 45s. was most unfair. Some gentlemen said that, in comparing the two classes of consumers, the cost of the services should not be taken into consideration in the case of slot consumers, but that the only extra charge to consider was the cost of the fittings. Surely these gentlemen would have some difficulty in proving this to their Directors or Committees. Imagine, for a moment, their average slot consumption is not a paying one; and you must agree that their total profit, in spite of ordinary consumers, would soon arrive at the vanishing point. Let them try it. The capital is affected by all first costs connected with the slot or ordinary consumer, and obviously all charges must be considered in any comparison on comprehensive lines. One speaker said that his extra charge was 5d. per 1000 cubic feet; another 1s. 3d. Just imagine the payment of an extra 1s. 3d. per 1000 cubic feet being held out as an *inducement* to a new section of consumers to use gas! Charge the 1s. 3d. until the extra pays for the fittings most certainly, and then give them gas at the same rate as ordinary consumers. All the disadvantages of the present slot system would be thus removed, the slot consumer would be supplied at a cheaper rate; the slot business would be based on sound principles; and, as a result, the consumption by slot consumers would increase by leaps and bounds

GEORGE HELPS.

Nuneaton, Oct. 13, 1902.

Drying Sulphate of Ammonia.

SIR,—In Mr. Stoddard's paper, read before the Manchester and District Junior Gas Association on the 27th ult., and given in the last number of the "JOURNAL," under the head of "Drying the Salt," it is stated: "In some cases, centrifugal machines are used for this purpose, *preferably over-driven*, as it allows of the salt being discharged through the bottom. The cage is constructed of copper, while the outer casing is made of thick lead (cast)." About fifteen months ago a centrifugal drier was added to our sulphate plant, and it may interest the members of the Association to know that, after examining over-driven and other types of centrifugals, requiring belts or gearing for the transmission of the driving power, I found a more advantageous method of driving provided in a small engine attached to the body of the machine (which is of steel sheets lined with chemical lead), and connected by flexible metallic tubing to the steam supply; the cage being driven by direct connection of the steam piston to a crank on the vertical spindle which carries the cage. This method also allows of "bottom discharge." The cage is of strong perforated copper, and was lined with copper gauze, of sufficiently close texture to prevent excessive passage of the salt while allowing free escape of moisture; but a very brief experience proved the unsuitability of this material, on account of the rapidity with which it was destroyed in use, and the expense of frequent renewal.

Casting about for a substitute, I tried several sorts of coarse cloth, and at last hit upon the very thing in a material used by horticulturists for shading purposes. I had two rings of cane made to which the material is stitched, the distance between the rings being the depth of the cage. Three small pieces of wood serve as stretchers to keep the material taut vertically, and the rings just fit tightly into the cage. A few moments suffice for changing this lining when a new one is wanted. The device has answered admirably. The material lasts much longer than one would expect, and the cost is only a few pence. The salt leaves this lining much more readily when discharging the contents of the cage, and the material does not become clogged. The economy of time and labour in the drying of the sulphate makes the centrifugal machine well worth its cost; and the type I have described takes up very little room. Its further advantages are found in the improved colour of the sulphate and the disappearance of all complaints from buyers, such as are not unknown to managers who have to depend upon the inclined floor for drying the salt.

JNO. C. BELTON.

Gas-Works, Chester, Oct. 10, 1902.

The Extraordinary Meeting of the Gas Institute.

SIR,—I beg to draw attention to the awkward time fixed for the above-mentioned meeting, proposed to be held at 2.30 p.m. on Saturday, the 1st of November next. The time as at present arranged may be very convenient to members who are situated 30 to 40 miles from London; but it will be very inconvenient to the largest proportion of the members of the Institute. Being fixed for the afternoon of a Saturday, it means that a large number will either have to remain in London over the Sunday or undertake a long tedious railway journey, or else not attend the meeting; and as no voting papers have been issued with the notice, they will for the time be disenfranchised. I hope that those in authority will reconsider the matter, and arrange for another day which will allow of a full week-day being available for the return journey, so as to make use of the fast trains.

PROVINCIAL MANAGER.

Oct. 11, 1902.

Greenock Gas Affairs.—We received a telegram yesterday morning from Mr. W. Ewing, Gas Engineer and Manager to the Greenock Corporation, to the effect that he is writing a reply to the letter of Mr. T. Mitchell on the above subject which appeared in last Tuesday's "JOURNAL," but that it must be held over till next week.

LEGAL INTELLIGENCE.

HOLMFIRTH COUNTY COURT.—Wednesday, Oct 1.

(*Before His Honour Judge* CADMAN *and a Jury.*)

Holmes v. Russell and the Holmfirth Gas Company.—Claim for Services Rendered.

This was a case in which Mr. A. E. Holmes, an auctioneer and valuer, sued the Holmfirth Gas Company and their late Manager (Mr. Hubert Russell, now of Callao) for the sum of £8 8s. for services rendered.

Mr. REED appeared for the plaintiff; and Mr. TURNER for the Gas Company. Mr. Russell was not represented.

Judge CADMAN explained to the Jury that the case was a claim for services rendered by the plaintiff to the defendants at various times, and particularly during November and December, 1898, January, 1899, and also in December, 1899, and January, 1900. Mr. Russell wrote to the Registrar on July 3 stating that he had received a summons some time previously from plaintiff, on which he had given notice to defend. In the first place, he did not owe the amount personally; and if there was any sum due it was for the Company to pay it. The work done was for the Company, by his (Mr. Russell's) order. The amount charged was excessive. As he sailed to South America that week, he would not, he said, be able to defend the action. His Honour said the action was one originally against Mr. Russell; but the Jury would see how it was that the Company had been made joint defendants.

Mr. REED at this point entered the Court, and at once proceeded to explain plaintiff's case. In 1898, he said, Mr. Russell was Manager and Secretary of the Company; and his position appeared to be almost everything. He entered into contracts, employed and discharged workmen, and did various other similar acts with the approval of the Directors. Mr. Russell was in the habit of doing all those things connected with the management of the Company in December, 1898, when he had to prepare some accounts. Either because his duties were so numerous or because he was not a first-rate accountant, Mr. Russell found it necessary to have someone to prepare the balance-sheets and accounts. Looking round for a likely person to assist him, he found the plaintiff. Under Mr. Russell's direction, therefore, plaintiff did certain work. Mr. Turner had demanded a Jury; but there did not seem to be any question of fact for them to decide, seeing that the reasonableness of the amount claimed was not questioned.

Mr. TURNER replied that the question of fact was whether or not the plaintiff had elected to treat Mr. Russell as his principal.

Mr. REED said to a certain extent this might be so; but the Company, having ratified the employment of the plaintiff, had become liable. They would find from the evidence that the Directors had done very little in the management of the Company. They allowed Mr. Russell to do things which they approved when they met and declared dividends.

Judge CADMAN: A one-man Company, with the approval of the Board of Directors.

Mr. REED quoted the sections of the Company's Act vesting the powers of management with the Directors, and pointed out that there was nothing in the Act which stated that no person other than the Directors could perform those duties. If the contention of his friend was true that no one could engage a servant of the Company except the Directors, then it was equally true that no one could appoint or dismiss a workman except the Directors. This section of the Act must be read in an ordinary common-sense way—that is, the Directors had the general management of the business, but, of course, could relegate their authority to someone else. Mr. Russell had been in the habit—and had been allowed by the Directors—to sell coke, engage officers, and execute pretty much the whole of the business of the Company. He had been allowed to employ and dismiss servants of the Company without any minutes of such employment or dismissal appearing in the books. The Company, in fact, appointed a Manager who could engage such persons as he pleased. He thought fit in 1898 to appoint the plaintiff to do certain accountancy work. The plaintiff was at work on the books in the Company's offices; and the Directors saw him engaged there, and acquiesced, as they allowed him to do the work. Subsequently plaintiff was engaged by Mr. Russell, at a salary of £7 10s. a quarter. He was not appointed by the Directors, and there was no resolution on the books to that effect; but some time afterwards there was a resolution in the minute-book that plaintiff's salary be paid. If Mr. Russell was entitled to engage the plaintiff at a yearly salary, and resolutions appeared in the books that the salary be paid, surely he had also power to engage plaintiff to do certain other work. The salary was for performing the work of Assistant-Secretary and Collector. The Company, he considered, were only sheltering themselves behind technicalities.

Plaintiff bore out the opening statement, and said that all his claims for payment had been made through Mr. Russell. He did not see any necessity to apply to the Directors for the money, as it would have appeared like going behind Mr. Russell's back.

Mr. TURNER: It would have let out that he was incompetent.

Judge CADMAN: It would have let out that the money was unpaid.

Plaintiff (continuing) said he requested his father, who was a Director of the Company, to mention the matter to the other Directors, and it was made known to some of them. He had applied to Mr. Russell, verbally and otherwise, more than fifty times for payment of the amount. The salary for the last quarter's work he did as Collector had also not been paid; but he did not include this in his claim, as he hoped to get it from the Company without putting them into Court.

Mr. TURNER then addressed the Court in defence, and said he thought the Jury would come to the conclusion that the Company were not wishful or disposed to act shabbily to plaintiff or to any other person with whom they had to deal. It was the duty of the Directors, as trustees of public money, to see that the affairs of the Company were administered in a proper and businesslike manner. His friend had brought forward the Act of Parliament, and had attempted to show that the position taken up by the Company was an absurdity; but he thought the Jury would see that the Company were merely doing their duty in defending the action. It was absolutely necessary, in the interests of all employers of labour, that they should know once and for all where they stood in regard to their high-salaried servants. Russell was engaged in June, 1898, as Secretary and Manager, and his duties as Secretary included the work of preparing the balance-sheet for which the Company were now being sued. The plaintiff believed that Russell was incompetent to prepare a balance-sheet, and for that reason had to get him to do it. The man who was appointed to do the work, and was receiving a large salary, was incompetent, so he got someone else to do it for him. So long as the Directors were not paying twice for their work—even if they knew their Secretary was getting someone else to do it and put him in the way—they would not quarrel with the arrangement. The Company's case was that they were not concerned with the amount, for they engaged a man to do that work, and it was not businesslike to pay a second person for work the first person should have done. The plaintiff said he did not know who the Holmfirth Gas Company were four years ago, though his father was a Director then. If plaintiff had sent in his claim to the Company at the time, or had his father brought it to the knowledge of the Directors, the latter would have taken care that they had not a servant in their employ at a large salary who engaged someone else to do his work. But years went by, and eventually the Company were sued. According to that, if they employed a servant to do certain work, and in turn he got someone else to do it, the employer would be liable for anything up to six years. His friend's contention meant that it came within the scope of Mr. Russell's authority to give the instructions to the plaintiff, and the Company having adopted the work must pay for it. But there was a further principle involved. There was plaintiff's book. The principle was there disclosed, as the account was entered up in plaintiff's book against "Mr. Russell, Secretary and Manager, Holmfirth Gaslight Company." Where a man knew who the principal was and who the agent was, he could sue the principal. If, knowing that, he liked to give credit to the agent, and leave the principal alone, and the agent failed, he was no longer entitled to turn round and say the principal was liable. The proceedings against the Company were an after-thought, as nothing was farther from plaintiff's mind originally than to charge that sum to the Company. He had told them "it would not have been right to have gone behind a man's back," because it would have shown the man up to his Directors.

Judge CADMAN asked the Jury to decide whether Mr. Russell was authorized directly or indirectly to employ other individuals in the management of the Company. Did the Company act in such a way as to show to the whole world that Mr. Russell was really the head and the front of the business of the Company, with their full authority? It did not need an express resolution to that effect. Was Mr. Russell authorized to order goods, employ and discharge servants, and do the work of the Directors? Did he do that work? It was alleged that he did; but they had no direct evidence of any particular individual being employed or discharged. It had not, however, met with any contradiction; and he thought they might take it that the Directors had such confidence in Mr. Russell that they gave him the fullest and freest hand in managing the business. So pleased were they with the success he achieved, that they raised his salary step by step until he got £250 a year. It was evident his balance-sheets were very satisfactory, when the salary was raised something like 160 per cent. in three years. Was there a single flake of evidence that plaintiff had treated Mr. Russell as a principal? Had he not treated him as the figure-head? They saw the figure of Agrippa at the head of a ship; but they did not say that figure-head was the ship. Mr. Russell was the figure-head of the Gas Company, and plaintiff entered his name in his book as "Secretary and Manager of the Holmfirth Gaslight Company." It was for the Jury to say whether plaintiff was trusting Mr. Russell personally or as the figure-head of the Company. If as a private individual, they would find against Mr. Russell, and for the Company; and if Mr. Russell was acting for the Company, they would find against them.

On returning to Court after a short absence, the Jury said they believed plaintiff was engaged by Mr. Russell on behalf of the Company.

Judgment was then formally entered for the plaintiff.

Welsbach Litigation in Australia.

In the "JOURNAL" for the 12th of August last (p. 407), we recorded the proceedings in an application by the Australasian Incandescent Gas-Light Company, Limited (now the Welsbach Light Company of Australasia, Limited), to the Supreme Court of Victoria, for a perpetual injunction and damages against a Mr. Charles Brown, of Melbourne, for infringement. The result, it may be remembered, was that Mr. Justice a'Beckett decided in favour of the Company, with £5 damages. The following is the official text of the judgment: "This Court doth order and adjudge that an injunction be granted restraining the defendant, his servants, or agents, during the continuance of the letters patent, from making, selling, supplying, or using any hoods or mantles manufactured according to, or in the manner described in, the complete specification in respect of which such letters patent were granted, or in manner only colourably differing therefrom, and generally from infringing the rights of the plaintiffs in respect of such letters patent. This Court doth further order (by consent, but without prejudice to any right of appeal) that the said defendant do, in lieu of accounts being taken forthwith, pay to the said plaintiffs the sum of £5 damages for such infringement. And this Court doth further order that the said defendant do pay to the said plaintiffs or their Solicitor (Mr. John Marshall Finlayson) the costs of, and occasioned by, this action when taxed by the taxing officer of this Court. And this Court certifies, pursuant to the 52nd section of the Patents Act, 1890, that upon the trial of this action the validity of the plaintiffs' letters patent No. 11,247, dated the 31st day of March, 1894, came in question."

MISCELLANEOUS NEWS.

MANAGEMENT OF THE NOTTINGHAM GAS UNDERTAKING.

Sir George Livesey to Report.

At the Meeting of the Nottingham City Council on Monday of last week, the special report of the Gas Committee (*ante*, p. 953) with reference to the charges made by Alderman Radford against the management of the undertaking under their supervision, was fully considered. After an announcement had been made that the Committee had secured the services of Sir George Livesey to investigate the whole matter, the Council were strongly of opinion that the report of the Committee should meanwhile be withdrawn; and ultimately the Chairman agreed to this course being adopted. The meeting was presided over by the MAYOR (Mr. E. N. Elborne).

Alderman FORD, the Chairman of the Gas Committee, in presenting the report, said he thought it contained all the information necessary to answer Alderman Radford. He felt compelled to say that he regarded it as very unfair on the part of Alderman Radford to bring these charges against the Gas Department at this particular time, knowing that during the last nine months they had been deprived of the services of their Gas Engineer; and he also thought he might have brought into his comparisons some of those towns which had lost considerable sums of money during the past year. He could only say that Alderman Barber, who was Chairman of the Committee for eighteen years, would not be a party to any underhand work. He was quite sure that anything he undertook to do would be done in an open and straightforward manner, for no man discharged his duty in a more disinterested way than did Alderman Barber. Therefore he thought the charges of Alderman Radford were very unfair indeed. Since the retirement of Alderman Barber, he (Alderman Ford) had been unfortunately placed in his position. He was unfortunate, because about the time he took the office Mr. Chester was taken seriously ill. Since January, he (Alderman Ford) had devoted a great deal of time to the work, and had done what he could to further the interests of the undertaking; and thus he got his thanks. He would like to give some figures with reference to what had been done since the transfer of the gas undertaking from the Company to the Corporation. Since the purchase, in 1874, there had been handed over to the Finance Committee out of the profits no less a sum than £472,825. The Gas Committee had also made contributions towards a sinking fund for depreciation, insurance fund, chemical works, &c., and repurchased annuities and debentures—making a total altogether of £584,012. There had been doubts expressed by some members as to the management of the undertaking. It had been under the consideration of the Gas Department to employ an expert; and he was very pleased to say they had secured the services of Sir George Livesey. He would go into the whole concern, and make a report, which in due course would be brought before the Council. Under these circumstances, it would be wise if they deferred the discussion for the present.

Mr. TRUMAN seconded the adoption of the report; pointing out that Alderman Radford had based his allegations on information he received from Sheffield. Comparison between the two towns was, however, quite impossible, because they were not established on the same lines. He believed it was the intention of the Committee not only to get a report from Sir George Livesey, but also to ask the newly-appointed Manager (Mr. J. H. Brown) to prepare one; so they would have the two reports brought before the Council.

Alderman PYATT proposed, and Mr. SKERRITT seconded, that a special meeting of the Council be called in Committee to discuss the report; but this amendment was subsequently withdrawn.

Alderman RADFORD then proceeded to reply to the report. He said, in quoting the comparisons between Nottingham and Sheffield, he had no hostile feeling towards the Gas Committee; for they all sympathized with them in the awkward position in which they had been placed by the long illness and subsequent death of their Engineer. At the same time, it had to be remembered that the Committee must in the end depend upon the officials who had charge of the concern. He was afraid that the report under discussion would bring very cold comfort to the members of the Council and the consumers, for it was imbued with that spirit of official fatalism that blocked all reform, and would persuade them that all was as it should be and could not be improved. The Gas Committee appeared to have quite made up their minds that Nottingham would always have to charge about 10d. per 1000 cubic feet more for their gas than Sheffield, owing to circumstances explained in their report. To this he took strong exception. It was not so in former years. In 1893, the average price for gas in Nottingham was 2s. 5½d., as against 2s. 2½d. in Sheffield; being a difference of 3d. only. In that year, Nottingham made £69,504 gross profit, and Sheffield only £56,785. The net cost in that year of Nottingham gas was 1s. 7½d., against 1s. 8½d.

in Sheffield. If, therefore, they could make gas eight years ago for 1s. 7½d. per 1000 cubic feet, they surely ought to be able to make it now for less than 2s. 1½d., the present cost—especially when it was remembered that, owing to the introduction of stoking machinery and inclined retorts, the cost of carbonizing had gone down from 3s. 2¾d. to 2s. 5½d. per ton. If the contention of this report was correct, then it was indeed a very discouraging outlook for the Nottingham gas consumer. The report admitted that the difference in the price of coal between Nottingham and Sheffield was 2s. 11¼d. per ton; but in another part it was stated that the extra carriage of coal was 2s. 1d. per ton to Nottingham on two-thirds of the total quantity carbonized. This averaged 1s. 5d. per ton on the whole; and therefore the Nottingham price, even when the extra carriage was deducted, was 1s. 6d. more than Sheffield. This amounted to £14,750. With regard to the sinking fund of £4305 and the contribution to the Finance Committee of £24,516, equal to 3¾d. per 1000 cubic feet of gas sold—and which, to his great surprise, was claimed in reduction of the 10d. difference in price existing between Nottingham and Sheffield—this showed a great error and a lack of knowledge of accounts; for it is dealing with realized profit. If they were to take this 3¾d. per 1000 feet off the selling price of the Nottingham gas, they must also give credit for the Sheffield profit off their price of gas, and thus set profits against profits. As to the length of mains, he found that in Nottingham, as given in "Field's Analysis" for 1901, there were 323 miles, and in Sheffield 484 miles, or exactly 50 per cent. more in Sheffield than in Nottingham; and therefore the two undertakings were practically on a dead level so far as length of mains was concerned. The paragraphs in the report dealing with the price of residuals were very important. The one in regard to coke was distinctly misleading; for he found in "Field's Analysis" for 1901 that Nottingham realized 12s. 2d. per ton for their coke, while Sheffield coke only realized 11s. per ton. Nottingham showed the highest amount realized for coke of any corporation works mentioned in the "Analysis." Since 1901, the fall in the price of coke had been relatively as great in Sheffield as in Nottingham. Tar products also sold higher in Nottingham than in any other large town in England, London included; the price per gallon in 1901 being 1·91d., while the average given in the "Analysis" was 1·37d. Ammonia realized a very bad price indeed for Nottingham, and was actually the lowest among the large corporations; being 11·78d. per ton of coal in 1901, and 13d. in 1902, against 2s. in Sheffield. This was a matter that required investigation and explanation. With regard to the coal contracts, he considered his remarks were fully justified, in the face of Sir Frederick Mappin's speech, in which he said the Sheffield saving in coal for the half year ending December last was £28,966. He had not the slightest doubt that the contracts were placed in the most straightforward manner; but this did not affect the judgment exercised in buying large quantities of coal. Judgment was also required in purchasing the best coal for gas making. The gas made by Sheffield from a ton of coal was 10,350 feet, while in Nottingham it was 9915 feet. This difference represented no less than £9184 which would have been produced more if the Nottingham coal had made the same quantity of gas as the Sheffield. Consequently it would appear either—although it might be capable of explanation—that the Nottingham coal had been of inferior quality for gas making, or that the gas had been lost through less efficiency in manufacture. In 1893, Nottingham made 10,481 feet per ton, while Sheffield produced 10,217 feet, showing a difference in favour of Nottingham of 264 feet per ton. Coming to the capital of the two undertakings, it was stated in the report that the Sheffield capital was £918,482, whereas that employed by the Nottingham Corporation was £1,119,333—being a difference, in round figures, of £200,000. Now, to balance the account and make a comparison, he would suppose that this £200,000 had disappeared or been floated away in annuities to the old Company, thus equalizing the amounts. Now, Sheffield for their capital had 161 miles more of mains, did 50 per cent. more business, sold gas at 2s. per 1000 cubic feet, and made a profit of £90,782; while Nottingham, selling gas at 2s. 10d. per 1000 cubic feet, made a profit, including interest and sinking fund, of £75,906—being a difference in earnings of £15,000 in favour of Sheffield. This pointed to one of two things—there must either have been a large expenditure of capital, with the effect of increasing the size of the plant beyond what was required for the amount of Nottingham business, or, on the other hand, there must have been reckless expenditure or unprofitable capital. But, taking it either way, it did not speak well for the management, nor could it be said, as stated in the words of the report, that the undertaking was "as economically conducted as by the Sheffield Company." There is another point. The difference of the average price of Nottingham and Sheffield gas was 9¼d. Now, 1d. per 1000 cubic feet of gas sold in Nottingham realized £7494, and at 9¼d. per 1000 feet it amounted to £69,373. The following summary showed where this £69,373 disappeared. Manufacturing: Coals, excess cost in Nottingham, £29,000; coke and breeze, excess cost in Nottingham, £5900; tar and its products, in favour of Nottingham, £2900; sulphate of ammonia, excess cost in Nottingham, £8200; purification, less lime sold, excess cost in Nottingham, £3200. Salaries: Wages, carbonizing, excess cost in Nottingham, £1400; repairs and maintenance, in favour of Nottingham, £1300. Distribution: Salaries and wages, excess cost in Nottingham, £4100; repairs to mains and services, excess cost in Nottingham, £5300; repairs to meters and stoves, excess cost in Nottingham, £10,000; depreciation of meters and stoves, in favour of Nottingham, £1800; rents, excess cost in Nottingham, £300; rates and taxes, excess cost in Sheffield, £3100. Management: Directors, Sheffield, £1000; salaries, collectors, stationery, printing, establishment charges, excess cost in Nottingham, £1600; bank charges, Sheffield, £1000; law charges and bad debts, Sheffield, £400; special donations to charitable and other institutions, excess cost in Sheffield, £1200; Sheffield net profits, less Nottingham interest, sinking fund, and profit, £12,300—total £81,900. Deducting amounts in favour of Nottingham, £12,700, left a total of £69,200. This accounted for the difference in selling price between Nottingham

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1002.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p.c.	19½—20½	..	5 2 5
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	July 1	5	Australian 5 p.c. Deb.	100—102	..	4 18 0
200,000	5	May 14	6½	Bombay, Ltd.	6—6¼	..	5 0 0
40,000	5	,,	6½	Do. New, £4 paid	4¼—4¾	..	5 9 5
380,000	Stk.	Aug. 14	12	Brentford Consolidated	249—254	..	4 14 6
270,000	,,	,,	9	Do. New	184—189	..	4 15 3
50,000	,,	,,	5	Do. 5 p.c. Pref.	125—130	..	3 16 11
206,250	,,	June 17	4	Do. 4 p.c. Deb.	111—114	..	3 10 2
220,000	Stk.	Sept. 11	1[illegible]	Brighton & Hove Orig.	207—212	..	5 1 5
246,320	,,	,,	[illegible]	Do. A. Ord. Stk.	152—157	.	4 18 9
460,000	20	Sept. 26	10	British	39—40*	..	5 0 0
50,000	10	Aug. 14	12	Bromley, Ord. 10 p.c.	22—24	..	5 0 0
82,850	10	,,	9	Do. 7 p.c.	18—22	..	4 10 0
500,000	10	May 14	7	Buenos Ayres (New) Ltd.	10¼—10⅜	..	6 10 3
250,000	Stk.	June 24	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
150,000	20	July 11	8¼	Cagliari, Ltd.	21—23	..	7 3 6
100,000	10	Sept. 26	10	Cape Town & Dis., Ltd.	14½—15¾*	..	6 9 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	54—56	..	5 7 2
550,000	Stk.	Apl. 11	12½†	Commercial Old Stock	268—273	+1	4 11 7
251,875	,,	,,	5½†	Do. New do.	205—210	..	4 10 6
271,875	,,	June 12	4½	Do. 4½ p.c. Deb.	130—134	..	3 7 2
800,000	Stk.	May 28	9	Continental Union, Ltd.	138—143	..	6 5 10
200,000	,,	,,	7	Do. 7 p.c. Pref.	140—150	−4½	4 13 4
575,000	Stk.	Aug. 28	5½	Crystal Palace Ord. 5 p.c.	118—123	..	4 6 8
60,000	,,	,,	5	Do. 5 p.c. Pref.	120—125	..	4 0 0
106,158	,,	July 11	5	Do. 5 p.c. Deb. Stk.	139—142	..	3 10 5
486,090	10	July 30	10½	European, Ltd.	17½—18½	..	5 13 6
354,060	10	,,	10⅓	Do. £7 10s. paid	13—14	..	5 12 6
15,243,200	Stk.	Aug. 14	4	Gas-light and Coke ⟨ 4 p.c. Ord.	88—90	+1	4 8 11
2,600,000	,,	,,	3½	⟨ 3½ p.c. max.	88—90	..	3 17 9
3,799,735	,,	,,	4	⟨ 4 p.c. Con. Pref.	107—109	..	3 13 5
4,193,975	,,	June 12	3	⟨ 3 p.c. Con. Deb.	92—94	..	3 3 10
70,000	10	Nov. 13	8	Hongkong & China, Ltd.	14—15	..	5 6 8
3,800,000	Stk.	May 14	10	Imperial Continental	205—207	..	4 16 7
473,600	Stk.	Aug. 14	3½	Do. 3½ p.c. Deb. Red.	98—100	..	3 10 0
561,000	Stk.	Aug. 28	10	Liverpool United A	227—229	+1	4 7 4
718,100	,,	,,	7	Do. do. B	165—167	..	4 3 10
306,083	,,	June 24	4	Do. do. Deb. Stk.	116—118	..	3 7 10
75,000	5	June 12	5	Malta & Medn., Ltd.	4¼—4⅜	..	5 5 3
560,000	100	Oct. 1	5	Met. of Melbourne ⟨ 5 p.c. Deb.	104—108*	..	4 12 7
250,000	100	,,	4½	⟨ 4½ p.c. Deb.	102—104*	..	4 6 7
541,920	20	June 12	5½	Monte Video, Ltd.	9—10	..	7 0 0
1,515,892	Stk.	Aug. 8	4½	Newc'tle & G'tesh'd Con.	104—105	+½	4 5 9
346,855	Stk.	July 4	3½	Do. 3½ p.c. Deb.	99—100	..	3 10 0
300,000	Stk.	—	8	Oriental, Ltd.	—	..	—
60,000	5	Sept. 26	7	Ottoman, Ltd.	6—6¼*		5 7 8

* Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
851,070	10	Apl. 25	7	River Plate Ord.	10—10⅛	..	6 13 4
300,000	Stk.	June 24	4	Do. 4 p.c. Deb.	93—96	..	4 3 4
250,000	10	Sept. 26	8	San Paulo, Ltd.	11⅛—12⅛*	..	6 8 0
135,000	Stk.	Sept. 11	10	Sheffield A	236—235	..	4 4 0
209,984	,,	,,	10	Do. B	236—238	..	4 4 0
523,498	,,	,,	10	Do. C	236—238	..	4 4 0
6,000,000	Stk.	Aug. 14	5⅓	South Met., 4 p.c. Ord.	122—124	+1½	4 6 0
1,700,000	,,	July 11	3	Do. 3 p.c. Deb.	91—93	..	3 4 6
380,940	Stk.	May 14	5	Southampton Ord.	102—106	..	4 11 4
87,950	,,	July 11	4	Do. 4 p.c. Deb.	102—105	..	3 16 2
120,000	Stk.	Aug. 28	6	Tottenham and Edmonton ⟨ A. 5 p.c.	118—123	..	4 17 7
303,520	,,	,,	4½	⟨ B. 3½ p.c.	93—98	..	4 11 10
182,380	10	Jan. 16	5	Tuscan, Ltd.	7—8	..	6 5 0
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	96—98	+½	5 2 0
230,000	5	Aug. 14	5⅓	West Ham, 10 p.c.	10—11	..	4 6 4
172,000	10	,,	6½	Do. 7 p.c.	13½—14½	..	4 9 8
				WATER COMPANIES.			
780,599	Stk.	June 24	11⅓	Chelsea, Ord.	300—310	..	3 14 2
150,000	,,	,,	5	Do. 5 p.c. Pref.	152—157	..	3 3 8
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	140—143	..	3 2 11
175,785	,,	Sept. 26	4½	Do. 4½ p.c. Deb.	137—142*	..	3 3 5
1,720,560	Stk.	Mar. 26	8	East London, Ord.	219—224	+1	3 11 5
654,740	,,	June 12	4½	Do. 4½ p.c. Deb.	142—147	..	3 1 3
1,282,943	,,	,,	3	Do. 3 p.c. Deb.	97—99	..	3 0 7
700,000	50		8	Grand Junction ⟨ 10 p.c. max.	110—115	..	3 9 7
310,000	Stk.	Sept. 26	4	⟨ 4 p.c. Deb.	125—130*	..	3 1 7
708,000	Stk.	Aug. 14	14	Kent	285—295	..	4 14 11
160,000	,,	,,	7	Do. New, 7 p.c. max.	195—205	..	3 8 4
1,043,800	100	June 24	11	Lambeth, 10 p.c. max.	290—300	..	3 13 4
406,200	100	,,	8½	Do. 7½ p.c. max.	210—220	..	3 17 5
350,000	Stk.	Sept. 26	4	Do. 4 p.c. Deb.	125—130*	..	3 1 7
500,000	100	Aug. 14	12⅛	New River, New Shares	385—395	−5	3 4 9
1,000,000	Stk.	July 30	4	Do. 4 p.c. Deb.	125—130	..	3 1 7
902,300	Stk.	June 12	7	South-wark and ⟨ Ord.	195—200	..	3 10 0
126,500	100	,,	7	⟨ 7½ p.c. max.	180—185	..	3 15 8
489,200	Stk.	,,	5	⟨ 5 p.c. Pref.	152—157	..	3 3 8
1,019,585	,,	Apl. 11	4	Vauxhall ⟨ 4 p.c. A Deb.	125—130	..	3 1 7
1,155,066	Stk.	June 12	10	West Middlesex	275—285	..	3 10 2
200,000	,,	,,	4½	Do. 4½ p.c. Deb.	139—144	..	3 2 6
200,000	,,	Sept. 11	3	Do. 3 p.c. Deb.	95—97	..	3 1 10

* Ex div.

† Next dividend will be at this rate.

and Sheffield. The Nottingham working expenses were exceedingly high, and this was where they suffer in comparison with other undertakings. The average of the nine large corporation gas-works given in "Field's Analysis," for the total working expenses, excluding coal, was 13·15d. per 1000 cubic feet. The Nottingham cost, the highest in England, was 17·32d., or 4·17d. per 1000 feet above the average. The Sheffield expenses were 14·36d., or (say) 3d. per 1000 feet below Nottingham—equal to £22,000 a year on working expenses alone. These expenses have largely increased in recent years. In 1893, the Nottingham expenses were 13·36d. per 1000 feet, as against 17·32d. in 1901, a difference of (say) 4d. per 1000 feet, or £30,000 per annum increased expenses in the eight years. Sheffield was not the only town to which they could compare Nottingham. Taking the nine large corporations in England owning their own gas-works, Nottingham charged 3d. per 1000 feet more than any of them. Under these circumstances, seeing that Nottingham was in the unenviable position of having the most expensively managed works among the large corporations of England, he thought the fullest consideration possible should be given to the matter, with a view to remedying it and removing the heavy burden and the present high price of gas, which was very detrimental to its more extended use. Their new Manager, Mr. Brown, was young, and he came to them with a brilliant record. In Nottingham he would find a wide field for his energies; and they would hope that within a reasonable time he would succeed in bringing the Gas Department into a better position.

A'derman Woodward said he did not think the comparison of Nottingham with Sheffield was at all a fair one. The former undertaking was acquired at a very heavy price, which largely accounted for the difference in capital. Then there was a further question to be taken into consideration in this—that at Nottingham they had to distribute gas over a large outside area at the same price as was charged the citizens. Alderman Radford had said that the price charged at Leicester was 2s. 6d. per 1000 cubic feet; but last year they only handed over £6000 in relief of the rates, as compared with £24,000 at Nottingham.

Alderman Fraser said it passed his comprehension to understand why the Gas Committee should have rushed into print with this report, and state a case which was at all events very argumentative; and he could not but think that the Committee must themselves now regret that the report had been printed. He believed the management of the gas-works was capable of improvement.

Alderman Pyatt hoped the Chairman of the Gas Committee would withdraw the report. He did not wish to vote against it, as this might seem to be a reflection upon the Committee; but, at the same time, he was not able to conscientiously vote for it, as he did not consider it a complete answer to the questions that came before the Council.

Alderman Ford, replying to the discussion, said he did not know that he had anything to add to his previous remarks. Alderman Radford had made use of such a multiplicity of figures that he really could not follow them. This gentleman had obtained information; and he (the speaker) supposed that it must be accurate, and that the Committee's reply was not correct. This, he thought, was the gist of Alderman Radford's remarks. They all wished to carry on the gas undertaking in a straightforward and honourable manner; they had no desire to keep anything behind the scenes. He was sorry the discussion had gone so far as it had done that morning, pending the receipt of the report from Sir George Livesey, though personally he was quite content that the matter had been brought forward, feeling sure that at the close of the next financial year the Council would have no cause for regret. He had received some information already as to what would be done; and he fully believed that shortly the Chairman of the Finance Committee would be congratulating them upon the success achieved.

The Mayor: Do you withdraw the report?

Alderman Ford: I think we might adjourn it until we get the expert's opinion.

Cries of "Withdraw" followed this observation; and Alderman Ford then said he would consent to the withdrawal of the report.

THE HARWICH GASHOLDER.

Further Controversy.

The erection by the Harwich Gas Company of a new holder on the Bathside—which, as has already been reported in the "Journal," has given rise to great opposition on the part of some members of the Town Council and a number of the ratepayers—was once more the subject of a long discussion at the meeting of the Town Council last Thursday. Notice having previously been given by Alderman Everard that he would move a resolution referring to the matter, the Town Clerk, Mr. A. J. H. Ward (who is also Solicitor to the Gas Company), promptly issued a circular-letter [see below] to the members of the Council, in which he gave his opinion with regard to the point in dispute.

Alderman Everard, in accordance with his notice, said he desired to draw the attention of the Council to the erection of a gasholder on the Bathside, and to move a resolution in regard to it. He at once commented upon the Town Clerk's letter, and said it was very comprehensive, and an able exposition of the position of the Gas Company up to the present time. It would have been more in order, however, if the letter had been signed, not by "A. J. H. Ward, Town Clerk," but by "A. J. H. Ward, Solicitor to the Gas Company." In the ordinary way, when a member gave notice of a proposition, it was for him to state his case, and then to be met by counter arguments. Instead of this, the Town Clerk had anticipated a certain version, and, assuming a certain thing, had taken upon himself to answer what he (Alderman Everard) intended bringing under the notice of the Council. As it happened, though no mention was made

Wright's "Eureka" Gas-Fires.

The "E.R."

Special new design.
Winter 1902 3.

The Gas-Fire here illustrated, unlike ordinary Gas-Fires, sets into any Coal Grate, without fitting, when front bars are removed, and is specially designed to meet the requirements of the coming season.

	B3061.	B3062.	B3063.	B3064.
To fit in Opening	*12 in.*	*14 in.*	*16 in.*	*18 in.*
Price, Stove Enamelled . .	15s. 6d.	18s. 6d.	22s. 6d.	27s. 6d.

Price includes Nickel-Plated Trivet.

of it in the resolution on the *agenda* paper, the Town Clerk had anticipated the very point to be raised. The Gas Company had, therefore, got the first blow; but whether it was fair or unfair, he left the Council to decide. The first question raised by Mr. Ward in his letter was that of the Public Health (Buildings and Streets) Act, 1888—the very one to which he (Alderman Everard) was going to refer. He anticipated, in bringing the matter forward, that an opinion might be advanced that the gasholder could not be described as a building within section 3 of the Act of 1888, and upon this point he had taken Counsel's opinion. Counsel was asked whether the Gas Company, without being liable to penalties, could erect the gasholder so that part of it would extend beyond the main wall of the house at the side of it in the same street; and if they persisted in doing so without the written consent of the Local Authority, where could proceedings be taken against them to recover penalties? Counsel's reply was that if, when the holder was erected, there was a house in the same street, and the holder, or part of it, extended beyond the front main wall of the house, the Gas Company would, unless such extension was consented to by the Urban Authority, be liable in penalties, or even to be restrained by injunction on an information being filed by the Attorney-General at the instance of the Urban Authority. Alderman Everard said it was only within the last five or six years that they were aware the Act of 1888 applied to them. It had been laid down that when a building came in two streets, discretionary power was given to the authority to say whether the building should be set forward or not. That was the matter before them that day. He should also like to call attention to the opinion of Mr. Ward, as cited in his letter, that the Gas Company's method of dealing with their land was controlled, not by a general statute, but by their Order obtained this year. By this it was meant that the Gas Company, having got permission to erect a gasholder, had a perfect right to put it where they liked, and had no need to regard the building line. This was Mr. Ward's view, and that gentleman also stated that a large majority of the Council were willing to take his opinion. That remained to be proved. Mr. Ward also, in his letter, set forth cases with a view to supporting his opinion. He (Alderman Everard) had placed the circular-letter before Counsel, whose opinion was that the cases mentioned by Mr. Ward were not on all fours with the one with which they were concerned. In the two cases mentioned, the land, it was proved, was acquired compulsorily; but in the case of the Harwich Gas Company it was obtained by agreement. He argued that the Gas Company could, if they desired, erect the holder in a way that would meet all their requirements without infringing the Act of 1888. He moved that, in the opinion of the Council, the Gas Company had contravened section 3 of the Public Health (Buildings and Streets) Act, 1888, by the erection of a gasholder, and had thereby rendered themselves liable to penalties. He thought a sufficiently strong case had been made out to warrant the Council applying for an injunction to stop the Company from proceeding further with the erection of the holder.

Mr. CANN, in seconding the motion, said the Town Clerk's opinion had been given unasked, and he did not think he ought to have given it on a controversial matter unless requested. Commenting upon the fact that it had been denied all along there was any building line in Canning Street, Mr. Cann said the Town Clerk now admitted there was. Counsel also agreed that there was, and that the holder was being erected forward of the line, and in contravention of the Act of 1888. He held that the Company's case for the erection of the holder had been supported by mis-statements, and he added that the Company now, finding the land not large enough, were erecting their holder beyond the building line, in order that another might be placed on the other side of the plot.

Alderman NALBOROUGH said he had always held that consent should be given to the Company for the erection of the holder, subject to the building line being observed. He had seen the plans of the property, and could come to no other conclusion than that there was no building line at all.

Mr. CANN: But the Town Clerk admits there is.

Mr. GRAY said, seeing the serious mistakes the Council had made in regard to building lines, the matter certainly was one that needed to be looked into. For this reason, he hoped the Council would support Alderman Everard's motion. They had had a well-prepared brief in the interests of the Gas Company, and he should like to see one put forward for the ratepayers on the Bathside.

Alderman EVERARD, replying to Mr. Applebee, said the question was whether the general statute was over-ridden by the Gas Company's Order of 1902, and upon this there was a difference of opinion. He wished to point out that his motion did not pledge the Council to any course of action; and, if it was adopted, he should propose that Counsel's opinion be taken.

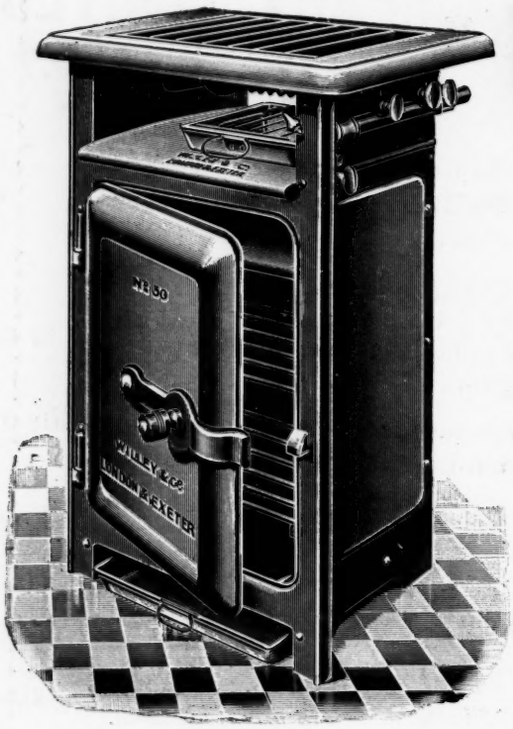
The resolution was then put, and lost by six votes to four.

The following are the main portions of the Town Clerk's circular-letter referred to above:—

Harwich Oct. 3, 1902.

Mr. Mayor and Gentlemen,—In view of the controversy which may arise at the next Council meeting upon Mr. Alderman Everard's notice of motion drawing attention to the erection of a gasholder on the Bathside, I think it may not be out of place if I take this opportunity of laying before you my opinion on the points of law which will probably be germane to the discussion, particularly with regard to the right of the Harwich Gas and Coke Company to erect a gasholder which is not in line with other buildings in Canning Street. I am prompted to reduce my opinion into writing, because, while I feel that a large majority of the Council will be prepared to take my advice, I am also not indifferent to the fact that some members may like to consult their legal advisers before they accept my dictum upon a matter in which they take the liveliest personal interest.

By the Public Health (Buildings and Streets) Act, 1888, it is enacted that "it shall not be lawful in any Urban District, without the written consent of the Urban Authority, to erect or bring forward any house or building in any street, or any part of such house or building, beyond the front main wall



SOMETHING REALLY NEW!

STAMPED
STEEL
SLOTS.

WILLEY & CO., EXETER.

of the house or building on either side thereof in the same street." There is no doubt that, under certain circumstances, a house or building can be in two streets, and there is also no doubt, in the case of the Company's gasholder, it is being erected beyond the building line of Canning Street. Whether it is a "building within the meaning of the Act" is a questionable point; but in my opinion it is. Presuming, therefore, that the gasholder was an ordinary dwelling-house, built fronting Stour Street and abutting on the footpath of Canning Street, the question arises whether the Council would feel justified in suing the owner thereof for penalties, and whether they would be able to persuade the Magistrates that it was a case in which penalties ought to be enforced. It will be found that practically, in every building estate in the borough, corner plots are only bound by one building-line; and, if it is decided that this is wrong, many of the most valuable sites still unsold, or purchased because they have double frontages, will be utterly useless for building purposes. This is the case on the Clifton Estate, the Bagshaw Estate, the Cliff Estate, the Sunnyhill Estate, and the Hill Crest Estate. Moreover, it is the case on the Bathside Estate; and, as a matter of fact, the Harwich Gas and Coke Company, though bound by their Deed of Mutual Covenants to observe a building line to Stour Street, have no such restriction binding them with regard to Canning Street. As also all the other owners in that and adjoining streets purchased with a full knowledge that the estate plans provided for the erection of buildings so as to cover the whole width of the plots fronting on Stour Street, it is difficult to see how they can now feel injured at this being done.

The above facts are relative to the merits of the case only; and it is for the Council to consider whether, if the Gas Company's premises were an ordinary house, they would be justified in asking the Magistrates to impose penalties for an infringement of the "Building in Streets Act." It is not for me to express an opinion on this point, but the Gas Company's premises are not an ordinary house, and their method of dealing with their land is controlled not by a general statute such as that quoted, but by their Special Act (the Harwich Gas Order, 1902, confirmed by the Gas Orders Confirmation Act, 1902), which over-rides it. By section 17 of the above Order, the Company are expressly authorized to hold and use the lands in question for the purposes of the Order, which purposes, by virtue of section 19, include the construction thereon of all such works as shall be necessary for, or incidental to, the storage of gas.

The two leading cases on the point under consideration are *the City and South London Railway v. the London County Council* (1891) (2 Q.B., 513) and *the London County Council v. the London School Board* (1892) (2 Q.B., 606). In the first case, the Railway Company were empowered by their Special Act to take and use such of the lands as were delineated on their deposited plans as might be required for the erection of a station. The Company accordingly erected a station which projected beyond the building line of Kennington Park Road; and it was decided by Mr. Justice A. L. Smith and Mr. Justice Grantham, as a Divisional Court, and, subsequently, by Lord Justices Lindley, Fry, and Lopes in the Court of Appeal, that the Company's Special Act repealed such portions of the General Act as were inconsistent with it, and that, consequently, by the terms of the Special Act the Railway Company were freed from any liability as to building lines. In the second case, it was held by Mr. Justice Wright and Mr. Justice Collins that the London School Board were authorized to build as they thought best by reason of the powers conferred upon them by their Education Act, and that they were not bound by the Metropolis Management Act, 1878, which regulated the line of buildings in streets, but which, being a General Act, was subservient to the Special Act.

My opinion, therefore, is that the Harwich Gas and Coke Company are freed by their Special Act from all obligations as to the building line of Canning Street, whether the same are real or only sentimental.

A. J. H. WARD, Town Clerk.

BARNARD CASTLE GAS COMPANY.

Progress of the Undertaking—Increase of Capital.

At the 103rd Half-Yearly General Meeting of the Barnard Castle Gas Company, which was held a few days ago under the presidency of Mr. R. T. Richardson, the Chairman, an interesting account was given by him of the growth of the undertaking. He said the Company was formed in 1834 for the purpose of supplying the townships of Barnard Castle and Marwood and Startforth with coal gas; and it being deemed expedient to lay down rules and regulations for the government of themselves as a Company, a deed, dated the 5th of December in that year, was executed, and was referred to as the Articles. The capital was £2500, in £10 shares, and there were 74 subscribers. As usual, it was insufficient; and they found that in 1836 there was a credit balance of £75 in the revenue account, which, with further sums amounting to about £370, had to be applied to street-lamps, improvements, and retorts. The first dividend of £100, being at the rate of 4 per cent., was paid in August, 1837, and for the next ten years it averaged 6 per cent. During this period, about £1000 was placed to capital account for land, building walls, enlarging buildings, and a new tank and gasholder. The price of gas was probably then 7s. 6d. per 1000 cubic feet. During the next ten or twelve years, to December, 1856, the dividend averaged 6½ per cent., with balances of about £20 carried forward each half year. In 1857 the works were extended. A sum of £700 was borrowed and repaid by instalments, the last in December, 1864, when the dividends were rather less. In 1868 the Company was incorporated, and the capital increased to £3120, and £500 borrowed money, which was paid off in 1871, in which year the price of gas was 4s. 6d. per 1000 cubic feet. In 1873 it was raised to 5s., and in 1875 it was reduced to 4s. 9d. In October, 1872, the capital was raised to £3744 (the amount at which it now stood) by the issue of new shares of 4s. each. The disastrous period in the Company's finances came in June, 1900, when only £74 was available for the payment of £187, the half-year's dividend. In the following December there was a deficit of £427, and June, 1891, produced only £62. It was estimated that the town got the benefit of £850 by the price not having been raised. The charge of 2s. 6d. for gas began in 1891; and, except for two years, when it was 2s. 8d., it had remained at that price ever since. He concluded by moving the following resolution:—

That it appearing to be desirable to issue new capital of the Company,

THE DAVIS GAS-STOVE COMPANY, LIMITED.

"The MONSOON."

Combined Radiating and Condensing Stove. The following are the main features which recommend it to the favourable notice of Gas Consumers.

1. **Handsome in Design.**
2. **Powerful in duty, combined with Economy in Gas Consumption.**
3. **Is fitted with our New Season's (1902-3) Highly Improved Non-Lighting-back Burner.**

Dimensions—37 in. High; 16½ in. Deep; 26 in. Wide.

PRICE - - - £8 0s. 0d.

Please send for our complete Catalogue of Gas Heating Stoves.

Head Office: **200, CAMBERWELL ROAD, LONDON, S.E.**

City Show-Rooms: **59, Queen Victoria Street, E.C.**

Foundries at Luton and Falkirk.

and it appearing from the last balance-sheet of the Company that there is a surplus of assets over liabilities to the amount of £5220 2s. 1d., and that annual profits have, from time to time, in past years, been added to the capital stock of the Company, under Article 27 of the Company's Articles, instead of being applied for dividend, and that such undivided profits so added to the capital stock amount in the aggregate to £4000 and upwards, and are represented by part of the above-mentioned surplus of £5220 2s. 1d., and it appearing to the Company to be desirable to apply part of such last-mentioned sum in payment of a bonus dividend in manner hereinafter appearing, it is hereby resolved as follows: (*a*) That a sum of £3744, free of income-tax and all other deductions, if any, being part of the said surplus of £5220 2s. 1d., be distributed as a bonus dividend among the members of the Company, in proportion to the nominal value of the shares or stock held by them respectively, such dividend to be paid and satisfied not in cash, but in the manner hereinafter mentioned. (*b*) That the capital of the Company be increased to £20,000 by the creation, as required, of 16,256 additional shares of £1 each, ranking for a dividend and in all other respects *pari passu* with the existing shares or stock of the Company. (*c*) The Directors shall, as soon as may be, out of the said 16,256 new shares, allot and issue to the holders of the Company's present capital such of the said new shares fully paid up as shall be necessary to satisfy the said bonus dividend, and as nearly as may be in proportion to the nominal value of the shares or stock held by members respectively. Prior to such allotment, the Directors may authorize any person, on behalf of the holders of existing shares or stock, to enter into any agreement with the Company providing for the allotment to them of such new shares credited as fully paid up and in satisfaction as aforesaid; and any agreement made under such authority shall be effective and binding on all persons concerned. (*d*) Any new shares hereby authorized to be issued, and not required for the satisfaction of the bonus dividend, shall be dealt with and disposed of in accordance with the Articles and Regulations of the Company.

The resolution having been carried unanimously, the Chairman moved two others authorizing the offer, out of the remaining 16,256 shares, of additional new shares to the amount of £3744 at par to the registered shareholders of the Company, and the borrowing of any sum not exceeding £1500 for the purposes of the undertaking; and they were carried *nem. dis.*

GAS SUPPLY AT INNERLEITHEN.

The town of Innerleithen, in Peeblesshire, has gas-works which date back to the "forties." The Manager, Mr. Laurence Bell, it may be remembered, presided at the last meeting of the Waverley Association of Gas Managers at Portobello, and gave the members a treat in the story he told of how he had done great things in getting the tweed-mill owners to abolish very largely the electric light, and substitute for it incandescent gas-lamps, which have been an amazing success. There are four tweed-mills in the town and two in Walkerburn, a village about 2 miles distant; and they have also adopted, or are going to do so, the incandescent gas system of illumination. At Innerleithen the whole of the conversion has not yet been carried out; but the plumbers are pushing on with it. The original gas-works were entirely burned down in 1882. Since the opening of the mills, the owners of which are the principal shareholders in the Gas Company, the gas industry has made great progress. For some time after the start, the storage capacity of the works was only 27,000 cubic feet, but some few years ago another gasholder was erected, which brings up the combined capacity to fully 80,000 cubic feet. The cost of the new holder, which is at some distance from the site of the works, was £1390. The Company have spent a lot of money in keeping the works in good order, and thoroughly up to date.

As to the plant employed, the present Manager early utilized a gas-engine to drive one of his exhausters; and he was also one of the first to adopt the system of regenerative carbonizing from his own design, which he believes to be a good one. There are five retorts in each arch, and fifteen in all. The Peebles process of enriching by gas oil was introduced some nine years ago, and ever since then it has been most successful. Mr. Bell was at first traveller for the Gas Enrichment Company, and Assistant to Mr. William Young, the inventor and patentee of the process. During the nine years it has been worked, nothing has gone wrong, nor has any personal injury been sustained. In the winter the proportions of oil gas and coal gas usually range about one of the former to six of the latter; and the oil coke generally runs about 5 cwt. to 15 cwt. of gas coke. The oil is not employed in the winter, and hard coal is used in the summer time.

The make of gas now runs to from 30,000 to 40,000 cubic feet per day; but when Mr. Bell was appointed Engineer and Manager, the consumption, which was then about 60,000 cubic feet, occasionally, without the use of the electric light, went up to 80,000 cubic feet. It also went up rapidly when the consumers were supplied with cookers, grillers, and slot meters. There are about 900 of these meters, and some of the users of them are occasionally prevailed upon to exchange them for shilling-in-the-slot meters. About 350 slot meters are in use at Walkerburn, with which there is a connection by about 2 miles of piping, and only one consumer on the way. The make and sale of gas run up to about 13½ million cubic feet, the dividend to the shareholders is always 7½ per cent., and the charge is 4s. 2d. per 1000 feet.

WATER PROFITS PAY ELECTRIC LIGHT LOSSES.

In the last number of the "JOURNAL," brief reference was made to a decision come to by the Derby Town Council to appropriate a considerable amount of the profits realized from the supply of water in the borough for the liquidation of the loss on the electric light undertaking. The proposal was discussed at some length in the Council, as will be seen from the following report of the proceedings forwarded to us by a correspondent.

The subject was introduced by Mr. Hart, who proposed—"That

Trade Mark on Labels.

Registered Stamp on each Mantle.

THE

"VIVID" MANTLE

Has established a reputation for being the most reliable Mantle.

It is protected by Letters Patent in Great Britain, America, and Germany.

The "VIVID" embodies the highest results obtainable, owing to the special process used in its manufacture.

NO LICENCE is paid on the "VIVID," either by Buyers or Sellers, and Litigation is prevented by the Order of the High Court of Justice (Chancery Division) before Mr. Justice Buckley, 20th of June, 1902. **(SEE OPPOSITE PAGE.)**

THE

"VIVID" PATENT INCANDESCENT MANTLE CO.,

OFFICES AND WAREHOUSE: 60A, WILSON STREET, LONDON, E.C.

the sum of £6948 be applied out of the profits of the water undertaking for the year ended March 31, 1902, to the district fund, to cover the deficiency on the electric lighting account for the two years ended March 31, 1901, and March 31, 1902, and also the additional quarter's interest charged to the electric lighting account during the year ended March 31, 1902." He said he was well aware that this resolution was quite an innovation, but he was firmly of opinion that it was a proper course to take. First of all, he should like to say that the Corporation had full power to do what he proposed under section 128 of the Derwent Valley Water Act, which he quoted *in extenso*. He then proceeded to remind the Council that a deficiency had arisen on the electric lighting account during the past year, but he did not think there was any necessity to raise a general discussion on the electric light undertaking. The matter would probably come before the Council in a report from the Committee, and, when this was submitted, no doubt it would be discussed. However, the fact remained that in the accounts which had been made up there was shown to be a loss of £3496 14s. 8d. upon the undertaking; but this included the amount of interest on the loan for five quarters, and consequently the actual deficiency last year was £2514. He mentioned this out of fairness. With regard to the Water Committee, he said they were informed that the reserve fund of that undertaking amounted to £52,000, and the proposal that the sum mentioned should be taken from it to pay the debt on the electric lighting undertaking emanated in the first instance from the Borough Accountant, who suggested that the Finance Committee should this year consider whether the Corporation would be justified in applying a portion of the profits of the water undertaking in the relief of the general district rate. He pointed out that this could not have been done under the Act of 1879; but this had been repealed by section 128 of the Derwent Valley Water Board Act, and could be done now. On the one hand they had an undertaking of the Corporation working at a profit, and another which was working at a loss; but he hoped the time was not far distant when it would be able to show a balance on the right side. He thought it was only fair that, at a time like this, when the rates of the town were so heavy, if they could relieve them a little they should do so.

The motion having been seconded, Sir Henry Bemrose expressed the surprise of the members of the Water Committee that this matter should have been placed upon the *agenda* without the Finance Committee having done them the courtesy to ask their opinion upon it. As the Water Committee had charge of the management of that undertaking and its finance, they should have been consulted by another Committee who wanted them to transfer to a non-paying mercantile concern the sum of £7000; and their proposal to do so without consulting the Water Committee struck him with astonishment. It was a precedent in the business of the Town Council which he could not think would occur again. He also opposed the proposal because of the unwisdom of the thing, and reminded the Council that in the course of a few years they would have demands from the Derwent Valley Water Board which probably would surprise the gentlemen who had the honour of sitting upon that Council, and might tax their ingenuity to a very considerable extent. The Water Committee were aware of this, and were anxious to build up a reserve fund for a specific object; and they did not think the proposal to alienate this money from its proper purpose was the right thing. It was unsound; and he ventured to say that no gentleman in that Council would pursue such a course in connection with his own concern—that was, if he wanted to keep straight. As he had said, in seven years there would be a heavy sum required from the Corporation for the Derwent Valley Water-Works; and he claimed that the Council should not allow this money to be deviated from its proper course.

Objection to the proposal was also raised by Alderman Newbold. He, like the preceding speaker, was a member of the Derwent Valley Water Board, and they were spending money freely. They knew they had to supply water, and, whatever the cost, they had to carry out their work. It was more than probable that they had ten years yet before they had to make any calls upon the rates; but they had to provide a sinking fund, and to do this they would have to keep their reserve intact. The Council would remember that the cost of the scheme would be about £3,000,000, and the annual expenditure would be extensive. They would require something like 5 per cent. for the sinking fund, which would have to be provided by the four Corporations. They would, therefore, have to find £160,000 between the towns of Leicester, Sheffield, Nottingham, and Derby, and Derby's share would amount to £40,000 per annum. As time went on, no doubt, the revenue from the water-works would be sufficient to carry on the operations. But it behoved them to be well prepared for the emergency; and if they knew of expenses amounting to nearly £50,000 per annum which were certain to come, they should pay attention to their sinking fund, and have something substantial with which to meet those expenses.

Some remarks having been made in support of the proposal, the Mayor (Alderman A. Woodiwiss, J.P.) asked Mr. Hart whether he would press his resolution, after hearing the discussion which had taken place. He pointed out that the deficiency was provided for in the rate already granted. As one of their representatives on the Derwent Valley Board, he assured them of the absolute necessity for preserving their reserve fund. It would not be long before the Committee would be coming to the Council for large sums of money, and they would then be asked why they wanted it. Referring to the Water Act, he said the clause which had been cited had really nothing to do with the reserve fund, but was inserted to give the Council power to use the profits from the scheme, when there should be any, for the relief of the rates, and not until the scheme was paid for. If their reserve fund was £50,000, and they took £7000 here and £8000 there, what was to become of it, and where would they be at the end of the next ten years? It was quite true they were spending large sums of money on the Water Board; but it must be remembered that they were dealing with millions there, and must necessarily spend large sums at a time. In conclusion, he expressed the hope that the proposed "suicidal policy"

THE — "VIVID" MANTLE.

IN THE HIGH COURT OF JUSTICE (Chancery Division).

Mr. Justice Buckley. 1902 B. No. 1968.

Mr. Carrington, Registrar (fos. 81). Friday, the 20th day of June, 1902.

Chancery Registrar's Office, entered 18th July, 1902—O. V. Keen, Clerk of Entries.

BETWEEN

SEPTIMUS BEVEN and CHARLES JOSEPH ALEXANDER

(trading as the "Vivid" Patent Incandescent Mantle Company) Plantiffs;

AND THE WELSBACH INCANDESCENT GAS-LIGHT COMPANY, LIMITED, Defendants.

Upon Motion this day made unto this Court by Counsel for the Plaintiffs, and upon hearing Counsel for the Defendants, both parties by their Counsel consenting to this Order and the Defendants by their Counsel undertaking not to threaten any person or persons by letters, circulars, advertisements, or otherwise with legal proceedings or liability in respect of the manufacture, sale, use, or purchase of the Incandescent Mantles made or sold by the Plaintiffs, and known as "Vivid" Patent Incandescent Mantles or otherwise, and from alleging that such manufacture, use, sale, or purchase is an infringement of the Letters Patent belonging to the Defendants,

This Court doth Order that the Defendants do pay to the Plaintiffs their costs of this Action, such costs to be taxed by the Taxing-Master.

And it is Ordered that all further proceedings in this Action be stayed, except in so far as may be necessary to enforce this Order. And for that purpose the parties are to be at liberty to apply as there may be occasion.

This Order was made by the Court with the consent of the Welsbach Co.

would not be persevered in, for he assured them that it would knock the heart out of their Committee.

The proposer of the resolution said he could not accede to the Mayor's request. Replying upon the discussion, Mr. Hart claimed, in the first instance, that it was always best to allow for an increase upon the previous half year. There was one point he must mention, and that was that from the figures he had put before them the rate for the next half year would be 4s. in the pound. It could not be less; but if this resolution were defeated, it would be 4s. 3d. The money that was now wanted would have to be found, and it must come out of the ratepayers' pockets in one form or another. He contended that the course recommended by the Finance Committee was the right one. On being put to the vote, the resolution was carried by 34 to 18.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Edinburgh and Leith Gas Commissioners have obtained the Royal Assent to an Order which they promoted last spring under the new arrangement for the conducting of Private Bill business. I suppose it may be said that the principal purpose of the measure is to give increased borrowing powers; but there are also other provisions which are worthy of note. The sum authorized to be raised is £620,000. Hitherto the Commissioners have been in the habit of granting their bond or mortgages upon their undertaking and upon the rates, in security of loans; but the method is costly and not well suited for an undertaking which at one period of the year has more than sufficient money on hand to meet all requirements, and which at another period is short of cash. The practice has been to get an advance from the bank; but this, again, is a costly way of raising money. Power has been taken, accordingly, to raise part of the loans now authorized by means of bills for periods of not less than three nor more than twelve months. An important provision is one which gives power to the Commissioners to make allowances to aged or disabled employees, or to the dependents of employees who may be serving with any of the Imperial forces in time of war or emergency. There is a restriction on the cumulo amount which may be voted in each year. It is not to exceed the rate of a farthing for every 1000 cubic feet of gas made in the Commissioners' works in that year. The payments are to be entirely in the discretion of the Commissioners. It may be said, as a matter of fact, that the scheme takes the place of a benevolent fund. This is a subject which has been talked of frequently; but there has always been felt to be a difficulty in imposing a rate of charge in support of it upon the wages of workmen who are constantly changing. The Commissioners have got over that difficulty by not asking for any contribution from the workmen. If any man is thought to be deserving of an allowance, he will get it; if he is not deserving, it follows that he will get nothing. The arrangement should be an incentive to good behaviour on the part of the workmen. In the closing of the existing works in Edinburgh and Leith, and the disposal of the lands which they occupy, there may arise a deficit, which, it is provided, will be made up from the reserve fund in the course of fifteen years. Power is taken to increase the amount which may be placed to reserve fund from £100,000 to £150,000. There is no reserve fund at present; but the Commissioners are now required to contribute to it in each year a sum equal to ¼ per cent. on the amount for the time being borrowed under the Order. The Commissioners are already advertising the site of the Leith works for sale. A new provision gives power to the Commissioners to enter any house and take away gas-meters. The reason for this is that, in houses where electric lighting has been introduced, it is quite common to keep the gas supply as a stand-by. Many meters are thus kept standing from year to year without earning anything. The Commissioners propose to take away these meters, and to substitute for them such meters as they may consider to be sufficient; or, if a person wishes to retain a meter which the Commissioners desire to remove, they are empowered to charge rent for it. Power is also taken to charge a higher rate for gas supplied outside the boundaries of Edinburgh and Leith, but not to a greater extent than 6d. per 1000 cubic feet. Then it is required that twenty-four hours' notice be given before any of the mains or pipes belonging to the Commissioners are uncovered or interfered with, so that the servants of the Commissioners may attend to them, and see to their repair or protection. This provision, if loyally worked, should be of great benefit to all the public bodies who have plant in the subsoil of the streets. The arrangements which I have enumerated are all founded on good reason, and will doubtless prove a valuable accession to the powers of the Commissioners.

The Town Council of Dunbar have reduced the price of gas from 4s. 7d. to 4s. 2d. per 1000 cubic feet. In the neighbouring town of North Berwick, the price has been reduced from 4s. 2d. to 3s. 9d. per 1000 cubic feet—the lowest price ever charged for gas in the burgh. In Dunbar, the population numbers 3500, and in North Berwick it is 2800. Yet the annual consumption of gas in North Berwick is over 19 million cubic feet, whereas in Dunbar it is only about 10 millions. There must be something to account for this great contrast in the usages of the people, and I believe it is to be found in the fact that in Dunbar the Corporation require consumers of gas to provide their own meters. This arrangement is a bad one, and now that the burgh is prosperous, an effort should be made to put it aside. In North Berwick the meters are provided free of charge to consumers.

There is a strange fascination about the use of electricity for lighting which compels its adoption when reason dictates that it is not the best light. In the Motherwell Town Council this week, it was reported, among other things, that two incandescent electric lamps are to be lighted in the mornings. The electric installation is new there, and the Council are not quite settled down in their management of it yet. One

"THE YORK" No. 557, £2 10s.

THE "MAIN"

GAS FIRES.

NEW AND ARTISTIC DESIGNS.

R. & A. MAIN,

LIMITED

LONDON: 214, St. John Street, E.C. GLASGOW: 26, West Nile Street.

Also Falkirk, Birmingham, Bristol, Manchester, and Huddersfield.

member of the Council objected to two large lamps being lighted in the mornings, and stated his preference for a greater number of smaller lamps being kept alight all night. He was informed that to light more electric lamps would be expensive, but that a number of gas-lamps are kept burning all night, so that the town is not in darkness after eleven o'clock. It is just so; the electric light is used for show purposes, and gas is employed to do the real work. Another illustration of the same fact is to be seen in Newcastle. There the street cars are run by electricity, and the cars themselves are ablaze with electric light. At the terminus, however, where the servants of the undertaking occupy an office, the light used is gas. Electricity is good enough for the public, who are doing nothing, to sit under, but when work is required, gas must be used. I daresay numberless instances of the same arrangement of lights could be given.

The Town Council of Grangemouth have been on the lookout for an augmentation to their water supply, and this week they have resolved to proceed with a scheme for taking in the water of the historic Bannock Burn. The cost is estimated at £41,200, which will necessitate a water-rate of 1s. 8¾d. in the pound till 1907, and after that the maximum rate will be 1s. 6½d. The drainage area is 2240 acres. It is proposed to construct a reservoir of a capacity of over 60 million gallons; and after providing compensation water at the rate of 200,000 gallons per day, it is estimated that a supply equal to 514,000 gallons per day will be obtained. A meeting of ratepayers to consider the subject is to be held next week.

But for two considerations, I would have passed over without comment the letter in this week's "JOURNAL," by Mr. Thomas Mitchell, regarding Greenock gas affairs, for it is hopeless to reason with a man who appears not to know the year he is reading about. The first consideration is his reference to my being at my "old game." I cannot allow such a remark to be made without protest. In what I write there is nothing which can bear the description he gives it. If, finding good work done at Greenock, I had depreciated it, I might have avoided wounding the susceptibilities of the former Convener of the Gas Committee, but it would have been a game, and would have been worthy of denunciation. The second consideration is that, for Mr. Mitchell's sake, I must admit that the year 1901 was an error. The sense of the paragraph showed everybody else that it was the year 1900 which was referred to as the time when Mr. Ewing went to Greenock. The quality of Mr. Mitchell's writing will be appreciated by readers of the "JOURNAL" when I explain, with reference to the illuminating power and the price of the gas, that it was in September, 1900, that, after an investigation by a Committee as to the cause of a deficit in the gas accounts, and on the motion of Mr. Mitchell himself, the price of gas was raised, as from the preceding May, from 2s. 11d. to 3s. 4d. per 1000 cubic feet. Last month—in September, 1902—the price was reduced to 3s. 2d. per 1000 cubic feet. Mr. Ewing went to Greenock in November, 1900. Yet Mr. Mitchell writes in this week's "JOURNAL" that "the illuminating quality of the gas made since Mr. Ewing became Manager has been reduced, on an average, by 3·20 candles; yet the gas is not reduced in price." Mr. Mitchell seems to have a peculiarly short memory when he does not remember that the price of gas was raised six months before Mr. Ewing went to Greenock, and that, less than a month ago, it was reduced; while the fact that it is not lower is due to the deficit which has had to be cleared off, and to other arrangements for which Mr. Ewing is not responsible. It would seem as if Mr. Mitchell is unable to see anything good about the gas-works, which is a serious defect in the capacities of a public man.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 11.

Sulphate of Ammonia.

The market has again been somewhat irregular, but the downward movement has not been arrested. The closing quotation f.o.b. Leith and Liverpool is £11 15s. per ton. Hull is mainly nominal; but the value is about £11 12s. 6d. per ton f.o.b. There has been more buying; but supplies have also been larger, and makers have only been able to dispose of their output at declining prices—consumers for the most part still holding aloof. For all October, spot prices are scarcely obtainable. In the forward position, there has been large inquiry, and London—Beckton terms—has been advanced to £11 15s. per ton. Scotch makes, October-March delivery, are also held for £11 15s. per ton, ordinary terms, f.o.b. Speculative sellers are offering abroad at below the parity of these prices, but without much success.

Nitrate of Soda.

This article is firm in all positions, and spot prices are 8s. 4½d. and 8s. 7½d. per cwt. for ordinary and refined qualities respectively.

LONDON, *Oct.* 11.

Tar Products.

The markets all round are fairly steady, and, with the exception of the lighter products, the demand has certainly improved. There is a very strong inquiry for creosote, especially for export; and this article appears likely to improve considerably. A large business has recently been done in both London and the North, and prices have an upward tendency, although, of course, the heavy make is now coming on, which may prevent any considerable rise in value. As regards anthracene, some transactions have taken place in "A" quality for delivery early next year; but, as a rule, the article is neglected. Benzol is in scarcely such good demand, although there are still buyers for forward delivery. Makers, however, will not contract except at improved prices, holding the opinion that we are not likely to see any further decline for some time to come. Crude carbolic maintains its position, and, in fact, shows signs of further improvement. There is a fairly good demand

THE
MAXIM PATENT CARBURETTOR
FOR ENRICHING GAS IN BULK.
PREVENTS NAPHTHALENE DEPOSITS.
OVER 100 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.
Among the Companies and Towns supplied are The Gas Light and Coke Company, The South Metropolitan Gas Company, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Southport, Alloa, Broughty Ferry, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past Seven Years.
MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.
THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.
The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.
Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.
For Prices and full Particulars, apply to
THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,
18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

from the Continent; but crystals are certainly quiet at the prices quoted. There is, however, an improved inquiry for liquid for prompt and forward delivery. Toluol and solvent remain in the same neglected state. There does not appear to be any inquiry for these articles.

The average values during the week were: Tar, 18s. 6d. to 24s. Pitch, London, 54s. to 55s.; east coast, 50s. 6d. to 52s.; west coast, 48s. to 48s. 6d. Benzol, 90 per cent., 8d. to 8½d.; 50-90 per cent., 7½d. Toluol, 6½d. Crude naphtha, 2½d. to 2¾d.; solvent naphtha, 7d. to 8d.; heavy naphtha, 9d. Creosote, London, 1½d. to 1 9/16d.; North, 1¼d. Heavy oils, 1¾d. to 1 5/16d. Carbolic acid, 60 per cent., 1s. 8¼d. to 1s. 8½d. Naphthalene, 35s. to 45s.; salts. 20s. to 22s. 6d. Anthracene, "A," 1½d. to 1¾d.; "B," 1d. nominal.

Sulphate of Ammonia.

The market is firm for prompt, but quiet for forward delivery The Gaslight and Coke Company are reported to have sold at £11 16s. 3d. for January-March, and £11 12s. 6d. for November-December, at which prices they are still open for business. Another large gas company accepted £11 12s 6d. for October shipment, but are no longer sellers at this price. In Hull, business is decidedly quiet. Sales are reported at £11 13s. 9d. to £11 15s. for October shipment. In Leith, there is really nothing to report. Quotations are nominally £11 13s. 9d. to £11 15s.; but no transaction appears to have been arranged. There is a pretty general impression that prices will be well maintained for November-December delivery.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Although reports as to the extent of buying for shipment to America to meet requirements there owing to the continuance of the dispute with the workmen have been much exaggerated, there has nevertheless been a good deal of coal shipped to the United States during the past week, and in sufficient quantity to stiffen prices here—especially for the medium and steam qualities. In odd cases, where collieries have been in a position to supply definite quantities promptly for delivery at the ports on the Mersey, they have been able to get special prices to the extent of about 1s. 6d. per ton above the average current rates, and generally quotations for shipping coal have hardened about 1s. per ton on the minimum of a week or so back. So far, however, as the inland trade is concerned, no material change is noticeable. Requirements for iron-making, steam, and general manufacturing purposes continue but indifferent, and pit prices on local sales do not average more than 8s. 6d. to 9s. per ton. In the better qualities of round coal, the steadily increasing demand for house-fire consumption is hardening prices; and in outside districts the advanced rates which came into force with the commencement of the month have been maintained without very much difficulty. Lancashire coalowners look forward to the probability of some general upward movement with the close of the present month. Collieries are now working practically full time; and only in exceptional cases is anything going down into stock. At the pit, prices are strong at about 13s. 6d. to 14s. per ton for best Wigan Arley, 12s. to 12s. 6d. for Pemberton four-feet and seconds Arley, and 9s. 6d. to 10s. for common house coal. The engine fuel trade remains unsatisfactory; and, except in the better qualities of slack, prices are scarcely being maintained, owing to the large surplus quantities now coming upon the market from outside districts. Most of the Lancashire collieries are moving away pretty freely their production in the better descriptions of slack; and for these pit prices average 6s. 3d. to 6s. 6d. per ton up to 7s. for special sorts, with good medium about 5s. 9d. to 6s. In the commoner sorts of slack there is, however, a good deal of competition. The figures of 4s. 6d. to 5s. per ton represent the minimum quotations for common Lancashire slack, with Derbyshire slack offering freely at 2s. 6d. to 3s, and some of the best sorts quoted at 3s. 6d.

Northern Coal Trade.

The coal trade has been stimulated and a little excited by the demand for fuel for the United States. There was not the expectation of any prolonged inquiry from that country; but it has made prices of some classes of coals advance, and has generally influenced the market. Best Northumbrian steam coals have risen to about 12s. per ton f.o.b., second-class steams are 10s. to 11s., and steam smalls are 5s. to 5s. 6d. Very naturally, with these prompt orders for America, the collieries are working fully, and they have business that will last for some time. In Durham coals, the effect has been less marked; but in one or two classes it is still visible. There is an irregularity in the prices of most descriptions of coal, which vary a good deal owing to the position of the colliery and the time of delivery. This is also evident in the gas coal trade, in which the quotations are from 9s. 6d. to 10s. 6d. per ton f.o b. according to quality, for occasional cargoes. No new contracts of note have been given out this week, though one or two for the South of Europe are in treaty. Gas coke is in a little fuller demand, but the production is steadily increasing; so that there is no change in the prices quoted.

Scotch Coal Trade.

Though there is a good deal of excitement in coal circles in Scotland over the situation in America, trade has not been much affected; the explanation given being that there is so much coal on contract that it is not available for export. The prices quoted are: Main, 8s. 6d. to 8s. 9d. per ton f.o.b. Glasgow, ell 9s. 9d. to 10s. 9d., and splint 10s. to 10s. 3d. The shipments for the week amounted to 241,249 tons—a decrease of 3445 tons upon the preceding week, but an increase of 22,263 tons upon the corresponding week of last year. For the year to date, the total shipments have been 8,155,509 tons—an increase of 541,038 tons upon the same period of last year.

C. & W. WALKER, LTD.,

Midland Iron-Works, Donnington, nr. Newport, Shropshire.

110, CANNON STREET, LONDON. E.C.

Telegraphic Addresses: "FORTRESS, DONNINGTON, SALOP." "FORTRESS, LONDON."
Codes used A.B.C. and "A1."
Telephone No. 12, WELLINGTON, SALOP.

GASHOLDERS
PURIFIERS

WITH OR WITHOUT STEEL STANDARDS AND TANKS.

IN CAST IRON OR STEEL.

PURIFYING-MACHINES FOR AMMONIA. SCRUBBERS.
TAR-EXTRACTORS. RETORT MOUTHPIECES OF ANY SHAPE.
Milbourne's Patent Gas Purifiers.
Milbourne's Patent Automatic Cover Fastener.

WECK'S PATENT CENTRE-VALVES.

CONDENSERS. Cripps's Grid-Valve, TAR-BURNERS.
Milbourne's Patent Grid-Valves,
SIEVES. For bye-passing the lower layer in Purifiers. VALVES.

TYSOE'S SELF-SEALING MOUTHPIECES

Tar-Distilling Plants. Claus' Sulphur-Recovery Plants.

SULPHATE OF AMMONIA PLANTS.

Dover and the East Kent Water Company.—In connection with the proposed extension of Dover borough boundaries, the Corporation has entered into an agreement with the East Kent Water Company to purchase their undertaking within the new boundaries on a basis of thirty-three years' profit. The Dover Corporation own the borough water-works, which yield an annual profit of nearly £2000.

Gas Purchase Question at Biddulph.—A proposal is on foot that the Biddulph Urban Council should purchase the local Gas Company's undertaking; and it has been decided to ask the Company whether they are prepared to pay half the cost of an expert's valuation of the concern, so as to form a basis for future negotiations. The works were erected in 1865; the annual consumption of gas being about 2½ million cubic feet. The profit last year was £130.

Lead Poisoning at Chesterfield.—There is an epidemic of lead poisoning in the northern portion of the Chesterfield rural district; and the death of one man at Dronfield is stated to have been due to the absorption of lead by the water in the public supply-pipes. Dr. Peck, the Medical Officer of Health, has reported to the District Council that he tested three samples of Dronfield water, and found lead in all of them. Immediate steps are to be taken to remedy the existing state of affairs.

Reductions in Price.—The Burslem Town Council have decided that the price of gas shall be reduced to 3s. per 1000 cubic feet, and that discounts ranging from 2d. to 4d., according to the quantity used, shall be allowed for prompt payment. The price to prepayment consumers is to be lowered to 3s. 3d. per 1000 cubic feet. At Carnarvon, there is to be a reduction of 3d. per 1000 cubic feet in the charge for gas; and at Hereford a similar concession has been agreed to. On the recommendation of the Gas Committee, the price of gas at Newport (Fife) is to be reduced 2d. per 1000 cubic feet, making the gross charge 4s. 10d., as from the last collection.

A Remedy for the Smoke Nuisance.—That a real remedy for the smoke nuisance has been discovered seems almost too good to be true. Readers of the "JOURNAL" will remember the difficulties of the Windermere Electric Lighting Company in connection with the disgorging of noisome smoke, which brought them into litigation. They adopted a process which had been recommended to them; and, so it is asserted, "the last vestige of soot disappeared," with the result that the Chancery proceedings to which they had been subjected were withdrawn. The method in question is the Wilson smokeless process; and it consists in the injection of a minute quantity of nitrate of soda in solution into the furnace, combined with a sufficiency of air to ensure complete combustion of the gases. Mr. Raworth, M.Inst.C.E., brought the subject before the British Association, and averred that the simple device of squirting a small mixture of air and nitrate of soda solution on a fire of soft, dirty coal, not only got rid of the offensive smoke, but increased the efficiency of combustion to the extent of above 20 per cent. It is further stated that this smoke destroyer costs only 3d. to 4d. per ton of coal burnt. All of which, it is hoped, will be proved by further trial to have a good foundation.

New Joint-Stock Companies.—The Anstruther and Cellardyke Gas Company, Limited, was registered in Edinburgh last week. The capital is £5000, in £1 shares. The public are not invited to subscribe for shares. Under the title of "Chris. Lucas, Limited," a Company has been registered with a capital of £10,000, in £1 shares, to acquire the business of a lamp manufacturer and hardware merchant carried on at the Atlas Lamp Works, Hockley, as Chris. Lucas, and the business of manufacturers carried on in Birmingham as the Murdoch Gas Fittings Company.

Electric Light Fails at an Inaugural Meeting.—Some consternation was caused at a meeting of ratepayers in the Birkdale Town Hall on the 9th inst. The electric light had just been installed, and the Chairman was opening the meeting, when the lights went out, and some one asked how it was that the gas had been shut off until the new light had been properly installed. Two candles were brought in—one for the Chairman and the other for the reporters—and the meeting proceeded, the audience in the large hall having to sit in darkness. It was stated that a fuse had broken.

Sales of Shares.—Mr. A. Morison recently offered for sale in the Royal Hotel, Airdrie, 360 fully-paid £1 shares in the Airdrie Gaslight Company. Fifty of the shares realized 26s. each, 200 of them 29s. each, and the remainder 28s. each. Some shares with 16s. paid thereon were sold for 15s. each. Last Thursday, the first 2000 shares, of £5 each, in the Portsmouth Water Company, issued under the powers conferred by their Provisional Order of the present session, were offered for public competition by Mr. E. H. Cooper, at Southsea. They fetched prices ranging from £6 5s. to £6 10s. each, the total amount realized being £12,741 5s.

New Gathering Ground for Oldham.—As the present water supply of Oldham is becoming inadequate to meet the demands, the Town Council have in contemplation the acquisition of a fresh gathering ground at Dean Head, on the Yorkshire moors. The Dean Head Commissioners, who own the reservoir existing there and the water rights, have agreed to accept £15,000 for the reservoir and other property. The scheme embraces the construction of two other reservoirs, and of a tunnel between 4 and 5 miles long, through which the water will be conveyed from Dean Head. The estimated total cost is £218,000; and the additional supply to be obtained by the tapping of this new area is estimated at 500 million gallons per annum.

Gas Testing in London on Sundays and Bank Holidays.—At the meeting of the London County Council last Tuesday, the report of the Public Control Committee on the above subject, to which attention was called in the "JOURNAL" last week (pp. 925 and 954), was submitted, and the recommendation of the Committee was agreed to. The action of the Council in this matter was translated by the "Daily Express" last Wednesday, for the instruction and edification of the general public, as follows: "Housewives are often troubled with their gas-stoves when cooking the Sunday dinner. It is said that on that day the gas is overcharged with sulphur. Yesterday the London County Council decided to make arrangements to test the gas on Sundays and Bank Holidays."

7½%

per annum,

To keep

our Coke-

Conveyors in THOROUGH

WORKING ORDER, is what

we will charge. This is not what

it costs; but as it is lower than the actual

cost on other designs of Hot-Coke

Conveyors, you may be glad to

accept our offer. We shall

be glad if

you do.

We have no need now . to Advertise our. . . Inclined Retorts in the "JOURNAL." They . . advertise themselves.

NEW CONVEYOR

CO., LTD.,

SMETHWICK.

100%

is the EFFI-

CIENCY of our Coke-

Conveyor. We guarantee

it to do certain work that is

specified, and it does it. Not 75 per

cent. or 200 per cent. It does all we say

and no more. It does not break the

Coke. It does not break down.

Twenty-five hours' stop in

Twelve Months'

working!

The Directors of the Imperial Continental Gas Association recommend a dividend of 5 per cent. for the half year ending the 30th of June, free of tax.

Messrs. Fletcher, Russell, and Co., Limited, have just issued new catalogues of their gas-heating domestic labour-saving appliances and their gas-fires, mantels, and register combinations. These are dated October, 1902, and are prepared in the handsome style with which the firm's customers have become familiar. In them will be found everything relating to the branches included in the titles; and the first-named of the two catalogues is fitted with a silk cord and brass ring for hanging up in a convenient position. The appliances illustrated are too well known to need any description on our part.

The South Metropolitan Gas Company have received permission from the London County Council to carry out certain works in the Tower Bridge Road Subway for the purpose of improving the public lighting.

We have just received a most comprehensive illustrated price list of engineers' and joiners' tools and machinery manufactured, factored, or imported and sold by Messrs. C. Nurse and Co., of No. 182, Walworth Road, London. This catalogue, which extends to nearly 350 pages, will be sent post free to anybody writing for it and mentioning the name of the "JOURNAL." It can hardly fail to be of interest to persons who use tools of any description; and it will therefore doubtless find a place on many gas-works.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

SITUATIONS VACANT.

ASSISTANT-ENGINEER. Cambridge Gas Company.
ASSISTANT-ENGINEER. Melbourne Gas Company. Oct. 31.
ASSISTANT-ENGINEER. Plymouth Gas Company. Oct. 21.
DRAUGHTSMAN. Balfour & Co., Leven, Fife.
DRAUGHTSMAN (Chief). South Metropolitan Gas Company.
DRAUGHTSMAN. No. 3918.
DRAUGHTSMAN. No. 3932.
GAS FITTER. No. 3925.
GAS-FITTERS. Birmingham Gas Department.
HANDY MAN. Penmaenmawr Gas-Works.
MANAGER. Fowey Gas Company. Oct. 17.
MECHANIC AND FITTER. Shipley Gas Department. Oct. 18.

SITUATIONS WANTED.

GAS-FITTER, &c. No. 3931.
FITTER. Baker, Colchester.
STOKER. No. 3930.

FINANCIAL ASSISTANCE WANTED.

GAS LIGHTING NOVELTY. No. 3928.

MEETING OF COMPANY.

IMPERIAL CONTINENTAL GAS ASSOCIATION. Nov. 4.

PLANT, &c. (Second-Hand), FOR SALE.

EXHAUSTER AND GASHOLDERS (various). Wright, London.
METERS (2 Light). No. 3923.
PURIFIERS, SCRUBBER-WASHERS, GASHOLDERS, &c. Firth Blakeley, Dewsbury.

PREPAYMENT METER ATTACHMENT.

WANTED TO PURCHASE. No. 3929.

SALES OF STOCKS AND SHARES.

BARNET GAS AND WATER COMPANY. Nov. 4.
BRENTFORD GAS COMPANY. Nov. 13.
BRISTOL WATER COMPANY. Oct. 16.
CROYDON GAS COMPANY. Nov. 6.
GREAT YARMOUTH WATER COMPANY. Oct. 28.
HARROW AND STANMORE GAS COMPANY. Oct. 28.
ILFORD GAS COMPANY. Oct. 21.
LOWESTOFT WATER AND GAS COMPANY. Oct. 21.
SOUTH ESSEX WATER COMPANY. Oct. 21.
SOUTHEND GAS COMPANY. Oct. 28.
TENDRING HUNDRED WATER COMPANY. Oct. 21.
WEST HAM GAS COMPANY. Oct. 29.
WEST SURREY WATER COMPANY. Oct. 27.

TENDERS FOR

COAL.

BELFAST GAS DEPARTMENT. 100,000 tons. Tenders by Oct. 23.

COAL BREAKER AND ELEVATOR, &c.

SHEFFIELD GAS COMPANY. Tenders by Nov. 3.

FIRE-CLAY GOODS.

SHEFFIELD GAS COMPANY. Tenders by Nov. 3.

OXIDE OF IRON (Spent).

SALFORD GAS DEPARTMENT. Tenders by Oct. 16.

PIPES, &c.

CLACTON URBAN DISTRICT COUNCIL. Tenders by Oct. 27.
GLASGOW GAS DEPARTMENT. Tenders by Oct. 21.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, M.E., Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.
BLACKBURN	1,250,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000

	Cubic Feet Daily.
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000
KINGSTON-ON-THAMES	1,750,000
ACCRINGTON	500,000
TONBRIDGE	300,000
STRETFORD	500,000
OLDBURY	300,000
TODMORDEN	500,000
SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
YORK (Second Contract)	750,000
ROCHESTER (Second Contract)	500,000
NEWPORT (MON.)	250,000
TOKIO, JAPAN	1,000,000
PERNAMBUCO (Brazil)	125,000
MALTON	150,000
DULUTH, MINN. (Second Contract)	300,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,800,000 Cub. Ft. SMETHWICK, 500,000 Cub. Ft. LEICESTER (2nd Cont.), 1,000,000 Cub. Ft.
GRAVESEND, 300,000 C. Ft. BROCKVILLE (ONT.), 250,000 C. Ft. NEWPORT, MON. (2nd Cont.), 250,000 C. Ft.

A Special Committee of the Crewkerne Urban District Council has been appointed to consider the question of the proposed purchase of the local Water Company's undertaking.

According to the Johannesburg correspondent of the "Daily Express," important discoveries of petroleum have been made in the Wakkerstroom district. The prospectors found an oil-bearing area many miles square; and they state that the oil is equal to the best standards produced in Scotland. Development operations are proceeding in charge of a Syndicate.

At the annual meeting of the Amalgamated Society of Railway Servants, held at Swansea last Wednesday, the course to be pursued in regard to the Taff Vale decision was further considered. This decision, it may be remembered, held that the Secretary of the Union was personally responsible for the costs of a successful action against the Union by the Taff Vale Railway Company. It was resolved that, as no useful purpose could be served by prosecuting the appeal, it should be withdrawn.

In connection with the recent tragic death of M. Émile Zola in Paris, to which reference was made in the "JOURNAL" last week, it is reported that in the course of the past winter there were upwards of 100 deaths in the French capital caused by the use of slow-combustion stoves.

Messrs. James Simpson and Co., Limited, of London and Newark, have forwarded copies of their new catalogues relating to the Webster feed-water heaters and purifiers and the Webster steam and oil separators. In connection with the steam-separators, special attention is directed to a newly designed cast-iron horizontal form, made in pipe sizes up to 12 inches. The object in preparing this design has been to provide a separator of the greatest possible efficiency, and to eliminate from it all joints other than those necessitated by the connecting flanges. This type is well adapted for modern high-pressure service, and for extreme pressures can be furnished in semi-steel. Several other new designs are also described. The catalogues are got up in first-class style.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in Advance. If credit is taken, the charge is 25s. a year.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON HOUSE,
OLD BROAD STREET,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications RE OXIDE to the COMPANY as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

BROTHERTON & CO., LIMITED.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

PENNY-IN-THE-SLOT WORK.

H. GREENE & SONS, Ltd., are pre- pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.

19, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "LUMINOSITY."

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

TO GAS AND WATER OFFICIALS.

HIGH CLASS CYCLES at lowest Prices guaranteed and sent on APPROVAL for Cash or GRADUAL PAYMENTS. Catalogue and Testimonials from Gas Managers post free.

MELROSE CYCLE COMPANY, COVENTRY.

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.

For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

BY the adoption of Cripps's Bye-Pass VALVES inside your Purifiers, you can relieve the Back-Pressure in the Lower Tiers when the Purifying Material gets hard. They are extremely useful and economical.

Sole Makers: C. & W. WALKER, LIMITED, Midland Iron-Works, Donnington, near Newport, SHROPSHIRE.

PATENTS AND TRADE MARKS PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.

MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 248 Holborn.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

DUTCH OXIDE OF IRON.

EERSTE Hollandsche Yzererts Maaty (First Dutch Bog Ore Company, Ltd.), ROTTERDAM.

General Manager (for England and Wales)—
CHARLES E. FRY, Leamington; and at Tower Chambers, Brown Street, MANCHESTER.

London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.

General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

SULPHURIC ACID for Sale.

BROTHERTON AND CO., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.

HIGHEST Grade Cycles, "Premiers," "Court Royals," "Triumphs," "Humbers," "Swifts," "Centaurs," and all best and choicest Coventry Manufactures on SPECIAL TERMS to GAS and WATER OFFICIALS. Agents Wanted.

Apply to the MANAGER, Imperial Cycle Supply Company, COVENTRY.

PROVINCIAL Gas Companies may pro- fitably consider the advantages offered by ACETYLENE for the PUBLIC and PRIVATE LIGHTING of OUTLYING PORTIONS OF THEIR DISTRICTS, which do not at present justify the expense of laying Coal-Gas Mains from the Central Works.

Correspondence on this subject is invited by the ACETYLENE ILLUMINATING COMPANY, LIMITED, 3, Victoria Street, LONDON, S.W.

AMMONIACAL LIQUOR wanted.

BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.

For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."

Largest Practice and most Up-to-Date Works in Britain.

JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.

IT is worth your while to buy direct. THE RELIANCE LUBRICATING OIL COMPANY 19 and 20, Water Lane, Great Tower Street, London, E.C., handle all kinds of Lubricating Oils, for Engines, Cylinders, Dynamos, Spindles, &c., Burning Oils, Solar Distillates, Carburetting Oils, and Spirits for Gas Making; Motor Oils, Fuel Oils, Animal, Fish, and Vegetable Oils, &c., for all purposes. Write for our "Trade Mark" Inkstand, sent free to customers. Non-customers, 2s. 6d. each. RELIANCE LUBRICATING OIL COMPANY, London, Glasgow, Newcastle-on-Tyne, &c. Established 1858. Telegraphic Address: "Substral," London; A.B.C. Code used. Telephone No.: Avenue 5591.

COAL GAS TAR wanted.

State Quantity to offer for Prompt and Forward Delivery.

The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

OXIDE OF IRON.

FIRE Cement, Paint, Mains, Tubes, STREET LANTERNS, GLASS, TOOLS, &c.
BALE & CHURCH,
5, CROOKED LANE, CANNON STREET,
LONDON, E.C.

LIME
FOR GAS PURIFICATION.

THE DUNSTABLE LIME COMPANY, Works: Sewell, Dunstable, Knebworth, Stamford, and Peterborough, Great Northern, Midland, and London and North-Western Railways.

Copy of Analysis of Lime from Knebworth Works—

Calcium Oxide (Quick Lime) . .	98·9
Magnesia and Alumina	0·5
Silica	0·6
	100·0

Head Office: PETERBOROUGH.

GAS TAR wanted.

BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SITUATION wanted as Fitter on Gas- Works, used to Compo. and Iron-Pipe Fitting, Meter Fixing, and Stove Repairing; also Tin Work, &c.

Address C. BAKER, 72, Castle Road, COLCHESTER.

WANTED, a Situation as Gas Stoker, anywhere. Experienced in all Branches of Gas Making. Age 28. Strong and Healthy. Unmarried. Can give good References.

Address No. 3930, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, re-engagement as Gas- FITTER. Used to Main Laying, Service Laying, Fixing Gas Fires and Cookers, Meters, and also Meter Reading. Ten Years' experience. Age 25.

Address No. 3931, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Good Draughtsman, thoroughly conversant with all kinds of apparatus for the Manufacture of Gas, also Conveying and Elevating Machinery. Must be capable of estimating Quantities and proficient in the preparation of detail Drawings.

Apply, by letter, stating Age and Salary required, to No. 3918, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CITY OF BIRMINGHAM.
(GAS DEPARTMENT.)

GAS-FITTERS WANTED.

APPLICANTS, under 40 years of age, must be fully qualified, used to fixing Wet Meters, and accustomed to all classes of Compo. and Iron Pipe Work, Stoves and Chandelier Fixing. Sample Meter Joints must be made by applicants prior to engagement. Permanent employment for suitable Men. Wages 8d. per hour, rising to 8½d. at end of Three Months if work and conduct are satisfactory.

Apply, with *copies* of Two recent Testimonials, to FITTINGS SUPERINTENDENT, Gas Offices, BIRMINGHAM.

THE Inventor of a great and much- needed NOVELTY IN GAS LIGHTING wants help in Patenting and Developing it, and offers a share (two-fifths) on very moderate terms.

Address No. 3928, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Gas-Fitter. Must be steady and reliable. One used to Iron and Compo. and fixing Gas Cookers and Fires.

Apply, by letter, stating Age, Wages required, and Experience, with *copies* of Testimonials, to No. 3925, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Handy Man, accustomed to Erecting Plant, Repairing Retorts, and capable of taking charge of small Works. Regular employment.

Apply, stating Wages, to G. E. SAVILLE, Gas Engineer, PENMAENMAWR.

DRAUGHTSMAN wanted at West- minster, with Experience of Gas and Water Engineering.

Apply, by letter, stating Age, Experience, and Salary required, to No. 3932, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

DRAUGHTSMAN wanted, immediately. Well up in Modern Gas-Works Plant; also Iron Roof and Structural Work. Must be able to design, take out quantities of Materials, &c. Salary £2 per week.

Apply, stating Age, Experience, &c., to HENRY BALFOUR AND CO., LTD., Leven, FIFESHIRE.

FOWEY, CORNWALL.

WANTED, a Gas-Works Manager. Annual make, 3 Million cubic feet. House provided. Rent, Rates, Taxes, Gas, and Coal free.

Applications, stating Age, Family, and Wages required, accompanied by *copies* of not less than Two recent Testimonials, must be received by the undersigned not later than Oct. 17 inst.

W. J. GRAHAM,
Secretary.

Fowey Gas Company, Limited,
Dated Oct. 7, 1902.

THE Shipley Urban District Council (Gas Department) require the Services of a thoroughly competent MECHANIC and FITTER. Preference will be given to one who has had experience with Gas Exhausters and Coke and Coal Conveyors.

Applications, stating Age, Experience, and Wages required, to be sent to me, endorsed "Mechanic and Fitter," not later than Saturday, the 18th of October, 1902.

I. LINDOW,
Clerk of the Council.

Manor House, Shipley,
Sept. 25, 1902.

SOUTH METROPOLITAN GAS COMPANY.

A CHIEF Draughtsman is required at the Old Kent Road Works of the above Company.

Applications for the post, which will be treated in confidence, may be made by letter only, without Testimonials, addressed to the undersigned, on or before the 28th of October next.

Preference will be given to a person who is familiar with up-to-date construction in Steel, Iron, and Concrete. A mechanical training and some knowledge of Gas or Chemical Plant would be desirable additional qualifications.

Applicants must state their Age, and give a detailed account, with dates, of their training and experience.

CHARLES CARPENTER,
Chief Engineer.

709, Old Kent Road, S.E.

METROPOLITAN GAS COMPANY MELBOURNE, AUSTRALIA.
(OUTPUT ABOUT 1200 MILLIONS).

ASSISTANT-ENGINEER required for the above Company. Salary about £650, no allowances.

Further Particulars, if required, can be obtained by applying (by letter only) to John Terry and Co., at the under-mentioned Address.

Applicants must be in perfect Health, Energetic, and thoroughly trained in latest Scientific Methods.

Applications, stating Age, Salary required, Qualifications, and Experience, and giving personal References, must be sent in before the 31st of October," to "CHAIRMAN," care of JOHN TERRY & CO., 7, GREAT WINCHESTER STREET, E.C.

PLYMOUTH AND STONEHOUSE GASLIGHT AND COKE COMPANY.

APPOINTMENT OF ASSISTANT-ENGINEER.

THE above Company require an As- SISTANT-ENGINEER. He must be a good Draughtsman, and have had experience with Regenerative Firing, and the manufacture of Carburetted Water Gas. He must also be able to undertake the complete Testing and Analysis of Gas and Residual Products.

Applicants to be between 21 and 30 Years of age. The Candidate appointed will be required to reside in the neighbourhood of the Gas-Works. The Salary will commence at £150 per annum, and rise by increments of £10 per annum to £200.

Applications to be by letter, stating Age, Qualifications, and Experience, and date on which duties could be commenced, and must be accompanied by *copies* of not more than Three recent Testimonials, and be delivered not later than Tuesday, the 21st day of October, addressed to the Chairman of the Company, and marked on cover "Assistant-Engineer."

P. S. HOYTE,
Engineer and Manager.

Gas-Works, Coxside, Plymouth.

CAMBRIDGE UNIVERSITY AND TOWN GASLIGHT COMPANY.

WANTED, at once, by the above Com- pany, an ASSISTANT to Engineer.

Applications, stating Salary Expected, Qualifications, and Experience, with *copies* of Testimonials, to be addressed to

JAMES W. AUCHTERLONIE,
Engineer and Manager.

Gas Company's Office, Cambridge.

A FIRM of Gas-Meter Makers are open to BUY a new PREPAYMENT ATTACHMENT for GAS-METERS.

Address No. 3929, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CHURCH LIGHTING — The Article which appeared in the "JOURNAL" for Sept. 23, by Mr. J. H. TROUGHTON, on "The Incandescent Gas-Burner in the Church," has been reprinted in Leaflet Form for distribution.

Orders (not less than a dozen copies supplied) should be addressed to the PUBLISHER of the "JOURNAL."

SECOND-HAND METERS.

A LARGE number of Two-Light and Three-Light WET GAS-METERS, in good condition, FOR SALE. What Offers?

Address No. 3923 (Lancashire), care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

TO BE SOLD—

EXHAUSTING PLANT, complete with Engine and Boiler, for 3000 to 4000 feet per hour.
GASHOLDER, 16 ft. by 10 ft. with 4 Columns.
GASHOLDER, 20 ft. by 10 ft. with 4 Columns and Suspension.
GASHOLDER, 45 ft. by 14 ft. with 5 Columns and Two Lifts.

Write J. WRIGHT, 181, Queen Victoria Street, E.C.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the purchase of about 1200 Tons of SPENT OXIDE.

Further Particulars and Form of Tender may be obtained from Mr. William W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.

Sealed Tenders, endorsed "Tender for Spent Oxide," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be sent to me not later than Three p.m. on Thursday, the 16th of October, 1902.

L. C. EVANS,
Town Clerk.

CITY OF BELFAST.

CONTRACT FOR COAL.

THE Gas Committee of the Belfast Corporation invite TENDERS for a supply of 100,000 Tons of best screened GAS COAL, to be delivered free and trimmed in Barges at Belfast Harbour, between the 1st of November, 1902, and the 31st of October, 1903.

No Tender for less than 10,000 Tons will be considered.

Monthly Quantities and Particulars may be obtained from the Manager of the Gas-Works.

Tenders, on Office Forms, endorsed "Tender for Coal," must be delivered at my Office not later than the 23rd inst.

The lowest or any Tender not necessarily accepted.

SAMUEL BLACK,
Town Clerk.

FIRE-CLAY GOODS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for the supply of SILICA and FIRE-CLAY GOODS, required at their Neepsend, Effingham Street, and Grimesthorpe Stations during the next Twelve Months.

Specifications and Forms of Tender may be had on application to the Company's Engineer, Mr. J. W. Morrison, on and after Oct. 18.

The Directors do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, marked "Tender for Fire-Clay Goods," must be delivered, by post, to the undersigned not later than the first post on Monday, Nov. 3.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
Oct. 11, 1902.

TO ENGINEERS AND IRONFOUNDERS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for the supply and erection at their Neepsend Works, of a COAL BREAKER and ELEVATOR, with CONVEYOR, ENGINE, HOPPERS, &c., complete.

Drawings and Specifications may be seen, and Form of Tender obtained, on and after Oct. 18, from the Engineer, Mr. J. W. Morrison, at the Company's Offices, Commercial Street, Sheffield.

The Directors do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Tender for Coal-Breaker," must be delivered, by post, not later than the first post on Monday, Nov. 3, to the undersigned.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
Oct. 11, 1902.

CLACTON URBAN DISTRICT COUNCIL.

THE above Council are prepared to re- ceive TENDERS for the Manufacture and delivery of about 100 Tons of CAST-IRON PIPES and CONNECTIONS.

Copy of the Specification and Form of Tender may be obtained from the Council's Engineer, Mr. Sydney Francis, Town Hall, Clacton-on-Sea.

Sealed Tenders, endorsed "Tender for Pipes," to be delivered to the undersigned not later than Twelve o'clock noon on Monday, the 27th of October, 1902.

The Council do not bind themselves to accept the lowest or any Tender.

GEO. T. LEWIS,
Clerk to the Council.

Town Hall Buildings,
Clacton-on-Sea, Oct. 7, 1902.

GLASGOW CORPORATION.
(GAS DEPARTMENT.)

THE Glasgow Corporation are prepared to receive TENDERS for 18, 20, 24, 30, and 36 inch diameter Mild Steel Lapwelded PIPES required for the Provan Gas-Works.

Specification and Form of Tender may be had, and Drawings seen, on application to Mr. W. Foulis, Gas Engineer, 45, John Street, Glasgow.

Sealed Offers, marked "Gas Department, Tender for Steel Pipes," to be addressed to, and lodged with, the Subscriber on or before Tuesday, the 21st inst.

The Corporation do not bind themselves to accept the lowest or any Tender.

J. D. MARWICK,
Town Clerk.

City Chambers, Glasgow,
Oct. 10, 1902.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
(INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of Proprietors of this Association will be held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 4th of November next, at 2.30 p.m. precisely, when a Report will be made to the Proprietors, a Dividend declared for the Half Year ended the 30th of June, 1902, and the usual Ordinary Business of such Meeting transacted.

Notice is Hereby also Given, that the CAPITAL STOCK TRANSFER BOOKS WILL BE CLOSED from the 21st inst. to the 4th prox., both days inclusive.

The Dividend will be paid on the 11th of November.

By order of the Board,
ROBERT W. WILSON,
Secretary.

21, Austin Friars, London, E.C.,
Oct. 13, 1902.

WEST SURREY WATER COMPANY.

ISSUE OF ADDITIONAL CAPITAL.

THE Directors of the West Surrey Water Company offer for SALE BY TENDER 1500 ORDINARY SHARES, of the nominal value of £10 each (Maximum Dividend 7 per cent. per annum), in Lots of Five or more Shares.

Minimum Price £15 per Share.

Last day for receipt of Tenders, Oct. 27, 1902.

Forms of Tenders and Particulars and Conditions of Sale may be obtained from the Secretary, at the Offices of the Company, No. 38, Parliament Street, Westminster, London, S.W.

By order of the Directors,
HENRY G. THOMPSON,
Secretary.

October, 1902.

BRENTFORD GAS COMPANY.

SALE BY TENDER OF £30,000 NEW STOCK, 1881.

IN Pursuance of the Brentford Gas Order, 1881, NOTICE IS HEREBY GIVEN, that it is the intention of the Directors of this Company to SELL BY TENDER £30,000 of NEW STOCK, 1881, of the Company, to be paid up in full on or before the 1st day of December next, such Stock being a portion of Additional Capital authorized to be raised by Resolutions passed at an Ordinary Meeting of Proprietors, held on the 11th day of February, 1898, under the Powers of the above-mentioned Order.

Particulars and Conditions of Tender may be obtained on application at this Office; and sealed Tenders must be sent in not later than Ten o'clock on the morning of Thursday, the 13th day of November next.

By order,
WILLIAM MANN,
Secretary.

Office: Brentford Gas Company,
Brentford, Oct. 13, 1902.

By order of the Directors of the
CROYDON COMMERCIAL GAS AND COKE COMPANY.

SALE OF £2500 FIVE PER CENT. PERPETUAL DEBENTURE STOCK AND
£5000 CONSOLIDATED "C" ORDINARY STOCK.

HOOKER AND WEBB have received Instructions to SELL BY AUCTION, at the Greyhound Hotel, Croydon, on Thursday, the 6th of November, 1902, at Six o'clock precisely, in Lots to suit Buyers of large or small quantities,

£5000 CONSOLIDATED "C" ORDINARY STOCK,
AND
£2500 FIVE PER CENT. PERPETUAL DEBENTURE STOCK

in the Croydon Commercial Gas and Coke Company. The Dividends paid on the "C" Stock for some Years have been at the rate of Nine per Cent. per annum, and since 1898 have been paid free of Income-Tax. The Reserve and Insurance Funds now amount to £44,534 17s. 4d.

Particulars and Conditions of Sale may be had of the SECRETARY, at the Offices of the Company, Katharine Street, CROYDON; at the place of Sale; and of the AUCTIONEERS, 4, High Street, CROYDON. Telephone No. 122 Croydon.